

ESCORT III USERS' MANUAL

Edited by

Ronald J. Blaha

NASA - Lewis Research Center

FIRST EDITION

JANUARY 1984

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If there are any comments or questions regarding this manual,
please contact Ron Blaha at PAX 6105, PBX 738, or H.S. 86-1.

I. SYSTEM HARDWARE

A. Overall System

Appendix A, Figure 1, illustrates an overview of the two computer configurations that are used. A VAX 11/780 is located in the RAC Building 142 and communicates with a PDP 11/34A located in the test facility. The VAX 11/780 is identified as the Supervisory Computer while the PDP 11/34A is identified as the Facility Computer.

The Facility Computer System includes all key interfaces to the test facility and the user, with only one exception. A terminal is located in the facility for direct contact with the Supervisory Computer.

The Supervisory Computer System provides the major computing power and file and data storage. It also provides network access to the Data Collector recording and the IBM 370/3033.

B. Intercomputer Data Communication

Appendix A, Figure 2, illustrates an overview of the total data communication requirement for all of the presently planned Escort III support.

The diagram shows four VAX 11/780 computers to support six PDP 11/34A minicomputers, five in test facilities and the sixth as facility simulation in the central area. An individual VAX 11/780 computer will be dedicated to support a single PDP 11/34A during run time of a facility. However, each VAX 11/780 will be capable of supporting two PDP 11/34A minicomputers for concurrent, less demanding performances, such as facility checkout and software generation.

Each VAX 11/780 DMR11 has selectable access to the Lab Data Buss channel of any PDP 11/34A DMR11/FDM Modem. Intercomputer communication supports serial 1 megabit full duplex operation.

The diagram shows a terminal with each PDP 11/34A that is tied to the CATV Lab Data Buss through a BIU. The primary purpose of this terminal is served as the VAX 11/780 terminal in the facility. The communication over the buss will conform to the CSMA/CD protocol on a single channel shared among all facility VAX 11/780 terminals.

C. VAX 11/780 Supervisory Computer System

Appendix A, Figure 3, illustrates the VAX 11/780 Supervisory Computer Configuration. The system includes the following major features:

- A 32 bit central processing unit (CPU) that includes floating point arithmetic, line frequency clock and programmable clock.
- A Floating Point Accelerator (FPA) that provides a high performance floating point arithmetic enhancement for the CPU.

- Two megabytes of ECC/MOS memory is provided, with expansion possible up to four megabytes on the same controller.
- An 8 kilobyte high speed cache memory is included to provide memory speed enhancement.
- Two Unibus adaptors are provided to allow the intercomputer communications to be serviced over a dedicated path separate from the other Unibus peripheral devices.
- Two separate disk systems are provided. First, two removable cartridge type disk drives, using a common controller on the shared peripheral Unibus, each provide 28 megabytes of file and data storage. Second, a high performance Winchester type fixed disk system, on a dedicated Massbus, provides an additional 124 megabytes of file and data storage.
- Two separate DMR11 communication processors are provided. One identical DMR11 communication processor is also included as part of each facility computer. The DMR11's handle the intercomputer communications between a VAX 11/780 and a PDP 11/34A. The VAX 11/780 DMR11's have direct memory access (DMA) over the second Unibus, dedicated to intercomputer communications. Each DMR11 contains input and output message buffers plus a microcomputer that supports one megabit, full duplex, serial communication and handles DDCHP message protocol with the other end of the link.
- An industry standard, EIA RS232, serial asynchronous interface is included on the second Unibus, as the interface to a BIU, for intercomputer communications with the Data Collector.
- A 300 line per minute printer is shared between two VAX 11/780 computers for software development. The printer is available to either computer through a manually controlled peripheral switch.
- A console subsystem provides a 180 character per second hard copy console terminal for operator interaction. The subsystem includes a PDP 11/03 microcomputer with 64 kilobytes of memory and floppy disk. An external port to the microcomputer is supported for exercising diagnostics on the VAX 11/780 from remote locations. DEC Service provides a Remote Diagnostic Service from Colorado Springs, Colorado as part of their service contracts.
- Two programmer terminals are provided. One is a 180 character per second hard copy terminal and the second is a black and white CRT terminal.
- Two ports are available, from the terminal line multiplexer, for support of the facility VAX 11/780 terminal and additional future support, as the need warrants, over the FH channel on the Lab Data Buss.

D. PDP 11/34A Facility Computer System

Appendix A, Figure 4, illustrates the Facility Computer Configuration. The system provides all the key interfaces to the test facility and the user. The system includes the following features;

- A PDP 11/34A sixteen bit central processing unit
- Maximum capacity 248 kilobyte MOS memory
- Battery backup for the memory with power failure detection
- Operator's control and display panel
- A 30 character per second console terminal for operator interaction and operating system message logging.
- A floating point processor is provided to enhance floating point arithmetic operations in the facility computer.
- A 10.4 megabyte cartridge disk system is provided to support file and data storage at the facility computer.
- A watchdog timer is included to provide an alarm when the system is not performing.
- A line frequency clock is provided for program timing functions.
- General purpose line printers are included in all facilities. 1000 Line per Minute printers are included for facility applications while a 300 Line per Minute is included for facility simulation. PSL 3 and PSL 4 Facility Computers will share one line printer in the data room and one line printer in the control room. Appendix A, Figure 4A, illustrates the line printer configurations.
- A DMR11 communication processor, identical to those included in the VAX 11/780, is provided. The DMR11 handles the intercomputer communication between the PDP 11/34A and the VAX 11/780. The DMR11 provides direct memory access to the computer memory, separate input and output message buffers and a microcomputer that supports one megabit, full duplex, serial communication and handles the DDCMP message protocol.
- A Data Acquisition and Control Subsystem provides the analog to digital data acquisition support for the facility computer. The subsystem also provides output and additional input features. The subsystem includes high speed direct memory access to the computer memory.
- A sixteen line asynchronous multiplexer provides input and output serial asynchronous data communications to a variety of user interface devices located remote from the computer. The multiplexer features DMA output data transfers, that is particularly useful for most of the devices.

- A 480 Line per Minute printer for log and alarm reporting is provided. 9600 baud data communication is provided.
- Pushbutton interfaces are supported, at 9600 baud, for each of four possible data acquisition locations as defined in the Data Acquisition and Control Subsystem description.
- Serial, input/output, daisy chained, 9600 baud communication busses are supported for each of the four possible data acquisition locations.
- The alpha-numeric CRT display requirement is supported through a DMA interface to the Alpha-Numeric Display Subsystem. The subsystem supports alpha-numerics at 100,000 byte per second data transfer rate for up to eight displays.
- The graphic CRT display requirement (future)
- Two parallel input/output interfaces provide direct access to the Unibus for special interface applications.
- Two EIA RS232 serial asynchronous interfaces provide for special subsystem interfacing.
- Data acquisition from the ESP system is through a DMA interface using the IEEE-488 communication protocol.

II. FULL SYSTEM SUPPORT

Uses a centrally located VAX11/780 as the supervisory computer and a facility located PDP-11/34a as an I/O Subsystem.

Full system support is used for run-time operation and for most pre-run functions directly supporting the test. The system is designed to support one facility and the facility simulation computer, at the same time, from one VAX supervisory computer. It is also possible for one supervisory computer to support two facilities at the same time. At run-time, a supervisory computer will be supporting only one facility. This is for maximum performance and reliability.

A. GETTING STARTED

The user gains access to ESCORT III with FULL SYSTEM SUPPORT with the following procedure:

1. Boot the PDP 11/34A facility computer

a. Cold Start (with power off)

1) Decwriter key positions

a) CAPS LOCK (down)

b) LINE LOC. (up)

c) 300 SPEED 110. (up)

2) Turn switch on computer panel to DC ON

Facility Computer Terminal Response:

```

|
| 000000 000240 000160 000300
| a
|
|

```

3) Push in yellow LOAD switch after it lights (once switch is pushed in, LOAD light will go out)

4) Press CNTRL and HLT/SS (halt/single step) keys together

5) Press CNTRL and BOOT keys together

```
|
| 000000 000240 165212 165530
| @
|
```

6) Type DL on the facility computer terminal

```
|
| RSX-11M V4.0 BL32 124.K MAPPED
| >RED DL:=SY:
| >RED DL:=LB:
| >MOU DL:RSXM32
| >@DL:[1,2]STARTUP
| >* PLEASE ENTER TIME AND DATE (HR:MN DD-MMM-YY) [S]:
|
```

7) Type the time and date

- a) Enter hour and minutes in military time separated by colon
- b) Skip a space
- c) Enter date of month followed by hyphen
- d) Enter first three letters of month followed by hyphen
- e) Enter last two digits of year

```
|
| >TIM 10:09 12-JAN-84
| >SET /BUF=TI:132.
| >SET /BUF=TT13:80.
| >ACS SY:/BLKS=512.
| >INS [1,1]F77RES
| >INS [1,1]GLOEL
| >INS [1,1]GLOBL2
| QUE -- Queue already exists
|
| >
| >UIC 200 200
| >
| >;
| >;; YOU CAN START UP ESCORT III FROM ANY UIC BY TYPING: E3X
| >;
| >@ <EOF>
| >
|
```

8) Type E3X

```

|
| <;
| <; 12-JAN-84 10:09:40 START UP ESCORT III
| >;
| >
| >UNL DG:
| >LOA DG:
| >LOA IB:/PAR=GEN/HIGH
| >; RESTART WATCH-DOG
| >; BRING DOWN QUE MANAGER SPOOLER
| >; RESTART WATCH-DOG
| *** DATA STATUS ***
| ESPS (ON/OFF)
| NEFFIN (ON/OFF)
| NEFFOUT (ON/OFF)
|
| >
| >* DO YOU WANT TO DOWN-LOAD FALCONS? [Y/N]:
|

```

9) Type Y

```

|
| >;
| >; 12-JAN-84 10:10:43 DOWN-LOAD FALCONS
| >;
|
| LOC A B C D
| CLR FALCONS 6, 0 -1, 0 -1, 0 -1, 0
| BUTTONS: 6, 0
| LAMPS: 6, 0
| N.E.P.: 6, 0
| PANEL/PHYS.: 6, 0
| RELEASE: 6, 0
|
|
| [FACOM ] 12-JAN-84 10:11:02 XB INIT
| >; 12-JAN-84 10:11:07 ESCORT III PROGRAMS RUNNING
| >;
| >; ***** CHANGE DATA I/O STATUS *****
| >;
| >* DO YOU WISH TO CHANGE DATA I/O STATUS? [Y/N]:
|

```

The purpose of this prompt is to allow to change the ESPS, NEFFIN and/or the NEFFOUT from an (ON/OFF) status to an (OFF/ON) status.

10) Type N only if no change in data I/O status is desired _____

```
|
| >@ <EOF>
| >
|
```

11) If a change or changes in data I/O status is desired, type a Y

```
|
| >
| >* CHANGE ESP INPUT STATE? (Y/N):
|
```

12) If a change in ESP input state is desired, type a Y

```
|
| >;
| >;; 12-JAN-84 10:11:27 [ESP DATA] SET (OFF/ON)-LINE
| >;
| >@ <EOF>
| >* CHANGE NEFF INPUT STATE? (Y/N):
|
```

13) If a change in Neff input state is desired, type a Y

```
|
| >;
| >;; 12-JAN-84 10:11:36 [NEFF IN ] SET (OFF/ON)-LINE
| >;
| >@ <EOF>
| >* CHANGE NEFF OUTPUT STATE? (Y/N):
|
```

14) If a change in Neff output state is desired, type a Y

```
|
| >;
| >;; 12-JAN-84 10:11:45 [NEFF OUT] SET (OFF/ON)-LINE
| >;
| >@ <EOF>
| >* ARE YOU SATISFIED WITH THE I/O STATUS? (Y/N):
|
```

15) Typing a Y will complete the cold start procedure
Typing an N will permit another change of the data I/O status

The facility computer will now be ready to support the full system services. If any errors are made during COLD START and cannot be corrected, proceed from Sec. II.A.1.a.4).

b. Warm Start (with power on)

1) Type E3X

Decwriter response the same as Sec. II.A.1.a.8).

c. Shut Down (for complete power down)

1) Type STS on central computer terminal if using SCAN

2) Type E3S on facility computer terminal

```

|
| ; 12-JAN-84 10:05:56 ABORT E3 PROGRAMS
|
| ARE YOU SURE? Y/N
|

```

3) Type Y (if anything but Y is typed, the program will remain operational)

```

|
| FACOM -- STOP
|
| >
| TIMSET -- STOP
|
| 10:06:02 Task "NIRB " terminated
|           Aborted via directive or CLI
|
| >
| BUTTON -- STOP
|
| >
| XBESP -- STOP
|
| >
| DATAQ -- STOP
|
| >
| IDDLPW -- STOP
|
| >
| >
| >;
| >; 12-JAN-84 10:06:12 ALL E3 TASKS ABORTED
| >;
| >;: BRING UP QUE MANAGER SPOOLER
| QUE -- Queue already exists
|
| >/
| >@ <EOF>
|

```

To restart system from this point, use Warm Start. This is a normal completion of facility computer shutdown. If complete power down is necessary, continue as follows:

4) Push LOAD switch out

5) Turn Switch on computer panel from DC ON to DC OFF

2. Access the central computer (VAX-11/780)

- a. Press the RETURN key on the central computer terminal
(To correct errors when typing, use the DELETE key for each character to be back spaced, not the BACK SPACE key.)

```

┌───
| $
└───

```

- b. If \$ appears, proceed to Sec. 2.h., otherwise continue

```

┌───
| #
└───

```

- c. Type one of the following:

1) CALL E310,1 (VAX#1)

```

┌───
| # CALL COMPLETED TO E310,1
└───

```

2) CALL E320,1 (VAX#2)

```

┌───
| # CALL COMPLETED TO E320,1
└───

```

3) CALL E330,1 (VAX#3)

```

┌───
| # CALL COMPLETED TO E330,1
└───

```

- d. Press the RETURN key again

```

┌───
| Username:
└───

```

e. Enter your program name: PADA74 (example)

```
|
| Password:
|
```

f. Enter your program password: PADA74 (example, won't appear when typed)

```
|
| Welcome to VAX/VMS version V3.2
| 14-SEP-1983 09:47:24
| ENTER APPLICATION NUMBER (1, 2,2L, OR <CR> FOR NO E3 RUN):
|
```

g. Enter 1 (2L used for facility simulator only)

```
|
| Previous logical name assignment replaced
| Previous logical name assignment replaced
| Previous logical name assignment replaced
| : : : : :
| : : : : :
| : : : : :
| : : : : :
| READ E3PAR.EDT INTO GLOBAL COMMON
|
| RUN-TIME TABLES BUILT
| $
|
```

h. Enter E3INIT (establishes communications with facility computer and completes initialization)

```
|
| VAX TIME SET TO 14-SEP-83 09:25:01.12
| E3 INITIALIZATION COMPLETE
| $
| 14-SEP-83 09:25:01 10X10X1 D168 REFERENCE RDG NO 2311 STORED
|
| $
| 14-SEP-83 09:25:04 10X10X1 D168 RDG 2311 TRANSMITTED
|
```

```
|
| BAROMETER REQUEST FAILED
| CURRENT BAROMETER IS 29.07 INCHES MERCURY
| DEFAULT TO ACCEPT OR ENTER NEW VALUE AS XX.XX
|
```

1. If above message appears, press RETURN key

```

|
| E3 INITIALIZATION COMPLETE
| $
|

```

Any of the commands defined in the COMMAND DESCRIPTIONS may now be performed.

3. Exit from the central computer

- a. IMPORTANT! If in SCAN, you must type STS

```

|
| >E3-RTHON-RTHON-10:37:39,14-SEP-83-0036,I- EXITING REAL-TIME MONITORING
| $
|

```

- b. Type LOGOFF

```

|
| PADA68          logged out at 14-SEP-83  10:38:38.03
|

```

For normal exit from the central computer, stop here. If complete disconnect from the VAX is desired, then continue.

- c. Press the ESC key and then the RETURN key

```

|
| #
|

```

- d. Type DONE and press RETURN key twice

```

|
| #SESSION 1 CLOSED TO E330,1
|

```

4. Checkout program

CHECK (if in SCAN, type STS)

The CHECK checkout program is run prior to bringing up the Escort III system to determine if all of the associated hardware is 'ONLINE'. This hardware includes the Neff, the number entry panels, the individual digital displays, the Falcons, the ESP system, the Aydin and CRT's, the button lamps, and the printers. If the Escort III system is up, CHECK will invoke E3S (see Sec. II.A.1.c.2)) to bring it down before continuing.

Some of the checks are completely automatic, while others require operator assistance. Checks which do not require operator assistance will print an error message at the operator's console, if an error condition exists. When operator assistance is required, the CHECK program enters a wait state and prints a prompting message at the console. The operator must depress the return key for the program to continue. If no error condition is present, the computer will proceed to check the next piece of hardware. It is not possible to repeat a single check before continuing with the program.

If the central terminal is in SCAN, an STS should be done before CHECK is executed.

SAMPLE:

>@CHECK

CHECKOUT 15:06:04 08-AUG-83

TURN ON POWER FOR THE NEFF, NEPS AND IDDS,
FALCONS, AYDINS, CRTS, AND LINE PRINTERS;
AND DON'T FORGET THE DH LINE(S) !

DEPRESS CARRIAGE RETURN TO CONTINUE

CHECKING THE NEFF...
NEFF IS OK !

CHECKING THE NEPS...
NEPS ARE OK !

PLEASE CHECK EACH IDD
DEPRESS CARRIAGE RETURN TO CONTINUE

CHECKING THE FALCON(S)...
FALCON(S) IS/ARE OK

CHECKING ESP SYSTEM...
IF NO ERROR MESSAGES ARE PRINTED, ESP IS OK

XBESP -- STOP

PLEASE CHECK EACH CRT
DEPRESS CARRIAGE RETURN TO CONTINUE

PLEASE CHECK THE LIGHTS
DEPRESS CARRIAGE RETURN WHEN YOU'VE SEEN ENOUGH

PLEASE CHECK THE LINE PRINTERS !

CHECK -- STOP

>

DESCRIPTION:NEFF

This check is performed by the computer. If no error condition exists, the response is:

CHECKING THE NEFF...
NEFF IS OK !

If there is an error condition, one or more of the following error messages will be printed:

CHECKING THE NEFF...

[CHECK] DATE TIME : ERROR - SERIES 500 BUS NOT RESET

[CHECK] DATE TIME : ERROR - CONTROLLER STATUS READ

The controller status cannot be read

[CHECK] DATE TIME : ERROR - INITIALIZATION OF NEFF PORT XX

Remote port could not be initialized

[CHECK] DATE TIME : ERROR - BOX XX SLOT XX GROUP XX

Indicates a problem with the designated card

[CHECK] DATE TIME : ERROR - PORT XX BOX XX SLOT XX GROUP XX

Indicates a problem with the designated card

NUMBER ENTRY PANELS (NEPS)

This check is performed by the computer. If no error condition exists, the response is:

CHECKING THE NEPS...
NEPS ARE OK !

If there is an error condition, one or more of the following error messages will be printed:

CHECKING THE NEPS...

[CHECK] DATE TIME : ERROR - NEP AT LOCATION XX DEVICE ADDRESS XX

Line check failure to the Falcon

INDIVIDUAL DIGITAL DISPLAYS (IDD'S)

This check requires operator assistance. The computer will clear each IDD and write the word CHECK to each display. It is the operator's responsibility to observe each display. The response for this check is:

PLEASE CHECK EACH IDD
DEPRESS CARRIAGE RETURN TO CONTINUE

If there is an error condition, one or more of the following error messages will be printed:

[CHECK] DATE TIME : ERROR - IDD AT LOCATION XX DEVICE ADDRESS XX

Indicates a problem while trying to write to designated IDD; should check IDD's visually

The operator must depress the return key for program to continue.

FALCON MICROCOMPUTER

This check is performed by the computer. If no error condition exists, the response is:

CHECKING THE FALCON(S)...
FALCON(S) IS/ARE OK

If there is an error condition, one or more of the following error messages will be printed:

CHECKING THE FALCON(S)...

[CHECK] DATE TIME : ERROR - FALCON LINE CHECK ENABLE

Error in the line check with the Falcon

[CHECK] DATE TIME : ERROR - LINE CHECK DATA FROM FALCON

Line check failed to the Falcon

[CHECK] DATE TIME : ERROR - FALCON CHECKSUM

May occur while the PDP-11 is trying to execute a line check with the Falcon

[CHECK] DATE TIME : ERROR - FALCON LINE CHECK RELEASE

Error in the line check with the Falcon

ESP SYSTEM

This check is performed by the computer. If no error condition exists, the response is:

CHECKING ESP SYSTEM...
IF NO ERROR MESSAGES ARE PRINTED, ESP IS OK

XBESP -- STOP

Note that the following message, by itself, does not indicate an error condition:

XBESP -- STOP

If there is an error condition, a typical response is:

CHECKING ESP SYSTEM...
IF NO ERROR MESSAGES ARE PRINTED, ESP IS OK

SRQ TIMEOUT.ESP PROBABLY OFFLINE
ESW= 1 SEQ= 2 ISB= 1 IOST(2)= 0
XBESP -- STOP

AYDIN AND CRT'S

The Aydin check is performed by the computer; the CRT check requires operator assistance. The response for this check is:

PLEASE CHECK EACH CRT
DEPRESS CARRIAGE RETURN TO CONTINUE

If an Aydin error condition exists and there is no power to the Aydin, the error message is:

[CHECK] DATE TIME : ERROR - COULD NOT ATTACH AYDIN

The power may not be turned on

The computer will clear each CRT and write the word CHECK to it. It is the operators responsibility to observe each display. The operator must depress the return key for the program to continue.

LAMPS

This check requires operator assistance. The panel lamps will be turned on and off in sequence - all of the upper lamps in the first half of the cycle, followed by the lower lamps during the second half of the cycle. The operator should observe at least one complete cycle to determine that all of the lamps are functioning properly. The response for this check is:

PLEASE CHECK THE LIGHTS
DEPRESS CARRIAGE RETURN WHEN YOU'VE SEEN ENOUGH

If there is an error condition, the following error message will be printed:

[CHECK] DATE TIME : FALCON ERROR - UNABLE TO CHECK LIGHTS

There is a Falcon problem while trying to check the lamps; this message is not always displayed, so the operator should visually check the lights

The operator must depress the return key for the program to continue.

PRINTERS

This check requires operators assistance. The program will do a form feed and print the word CHECK at the top of the next page, on both the line printer and the alarm printer. The operator should verify that this has occurred. Also, if the line printer is not ready, the response is:

15:10:22 *** LPO: -- Not ready

The final response at the end of the CHECK program is:

PLEASE CHECK THE LINE PRINTERS !

CHECK -- STOP

B. PREVIEW OF SYSTEM COMMANDS

The services available under FULL SYSTEM SUPPORT are invoked and controlled by a combination of function panels and ESCORT III commands, entered through the remote VAX 11/780 terminal. These services are in general:

DATA ACQUISITION

DATA DISPLAY

PERFORMANCE CALCULATIONS

LIMIT CHECKING

DATA RECORDING

DATA PLAYBACK

The function panels are further discussed in Sec. II.G. (INPUT FUNCTION BUTTONS AND ENTRY PANELS). The commands are documented in detail in Sec. II.K. (COMMANDS DESCRIPTIONS). The commands are grouped in functional categories. The functional categories and the commands available in each category are as follows:

1. PRE-RUN

E3INIT

Establishes a communications connection between the supervisory computer and the facility computer, and initializes tables

STAT

Prints statistical noise check of all Neff and ESP channels

CALIB

Performs pre-run calibration on Neff Class 1 channels

SAVE

Defines the baseline run conditions to be the current conditions with respect to codeouts, substitutions, and forces

RESET

Resets the current run conditions to the baseline conditions

BPRINT

Prints the baseline run conditions with respect to codeouts, substitutions, and forces

CPRINT

Prints the current run conditions with respect to codeouts, substitutions, and forces

SIMRUN

Simulates real-time monitoring with stored data from known test conditions

2. REAL-TIME MONITORING

SCAN

Starts real-time monitoring of system

STS

Stops real-time monitoring of system

MCALIB

Prints coefficients for dynamic calibration of Neff multiplexer channels

LIMON

Arms channels or groups of channels for limit checking

LIMOFF

Disarms channels or groups of channels for limit checking

COUT

Codes out channels

CIN

Reactivates a previously coded-out channel

STDUMP

Invokes a status dump of all channels

RDUMP

Invokes a research dump

LDUMP

Invokes a dump of all limit check messages

SUB

Substitutes one channel for another

UNSUB

Removes a substitution of one channel for another

FORCE

Forces a channel to have a specified value

UNFORCE

Removes the force of a specified value for a channel

3. CHANNEL EDITING

CHAN

Edits parameters associated with sampled and calculated channels

COEF

Edits polynomial conversion coefficient blocks used to convert millivolts to engineering units

4. DISPLAY EDITING

DISP

Creates a new alphanumeric display or modifies an existing one for a CRT or an IDD set

5. LIMIT CHECK EDITING

LIMIT

Edits limit blocks that are used to define limit checking for sampled and calculated channels

6. PARAMETER INPUT

PARAM

Reviews and changes application parameters

E3PAR

Reviews and changes system parameters

7. HISTORY FILE

PLAYBACK

Runs the playback of history file data

BLDHF

Builds a history file to meet the requirements of the current test

If you enter a command that requires parameters and do not specify the parameters, the system will prompt you for all the required parameters. If the parameter is optional, omitting it will result in a default value. Default values are defined in the Command Descriptions Section. Some commands involve detailed specification that is handled through dialog in addition to the prompting for unspecified parameters. It is sometimes preferable to edit the required data using a general purpose TEXT EDITOR. This method of editing is available for channel, display, and parameter specification data that is normally edited through the CHAN, COEF, DISP, LIMIT, E3PAR, and PARAM commands. These commands create ASCII files that can be edited with the VAX EDT or other general purpose text editors. The file names and formats of these files are documented in the command descriptions together with the corresponding interactive commands.

C. DATA ACQUISITION

1. NEFF DATA ACQUISITION AND CONTROL SUBSYSTEM

The Neff Subsystem is one of the primary data acquisition sources for the Escort III system. It provides the analog input equipment for scanning and converting analog voltages from the many facility instrumentation devices. The subsystem also provides:

- a) digital inputs with register storage
- b) digital input sensing with bit interrupts
- c) pulse counters
- d) digital to analog converter outputs
- e) digital registers with output relay contacts
- f) digital registers with TTL outputs

Appendix A, Figure 5, illustrates data acquisition and control support for four separate locations A, B, C and D. Location A is adjacent to the PDP 11/34A computer while locations B, C and D can be up to 500 feet remote from the computer. Locations A and D support analog input equipment. All locations support all other devices that have been mentioned.

The subsystem hardware is Neff Instrument Corporation System 620 Series 100, 200, 400 and 500 equipment. Refer to the manufacturer's reference manuals for detailed specifications and operating characteristics.

The subsystem interface to the PDP 11/34A computer provides a high speed DMA interface and interrupt access.

The subsystem provides the ability to continuously sample analog input channels in any random order, at their maximum sample rate, while providing concurrent access to the other individual input/output devices. Each analog input equipment feature includes a semi-intelligent controller that includes:

- a) a 4000 word scan pattern memory
- b) two 4000 word ping pong data buffers
- c) flexibility for scan control from any area of the scan pattern memory
- d) data buffer accumulation of acquired data words
- e) DMA transfer of data from buffers to the computer memory at rates up to 300K words per second.

Six separate subsystem configurations are defined to satisfy analog input, digital input, analog output and digital output needs at 10X10 SWT, Facility Simulation, PSL-3, PSL-4, 8X6 SWT and 9X15 LSWT. Detailed Neff Instrument Corp. subsystem configuration diagrams are illustrated in Appendix A, Figures 6 through 11. The configurations are included in this section as functional location tables.

Even though initial configurations have been defined, it is important to note that the devices can be reconfigured and supported through any of the locations A, B, C or D. However, reconfiguration will have an application software impact.

10X10 SWT CONFIGURATION	LOCATIONS		
	A	B	D
PDP 11/34A Computer Interface	None	None	Required
Subsystem Chassis	Required	Required	Required
Subsystem Controller	Required	Required	Required
Class 1 Analog Input Equipment, Channels	None	None	200
Class 2 Analog Input Equipment, Channels	None	None	None
Digital to Analog Converters	8	8	8
Digital Inputs with Register, Discrete Inputs	32	64	64
Digital Inputs Sense with Bit Interrupt, Discrete Inputs	64	96	96
Digital Outputs, Relay, Discrete Outputs	16	32	32
Digital Outputs, TTL, Discrete Outputs	32	64	64
Pulse Counters	4	4	4

Illustrated in Appendix A, Figure 6

FACILITY SIMULATION CONFIGURATION	LOCATIONS			
	A	B	C	D
PDP 11/34A Computer Interface	Required	None	None	None
Subsystem Chassis	Required	None	None	Required
Subsystem Controller	Required	None	None	Required
Class 1 Analog Input Equipment, Channels	16	None	None	None
Class 2 Analog Input Equipment, Channels	None	None	None	32
Digital to Analog Converters	8	None	None	None
Digital Inputs with Register, Discrete Inputs	32	None	None	64
Digital Inputs Sense with Bit Interrupt, Discrete Inputs	32	None	None	64
Digital Outputs, Relay, Discrete Outputs	16	None	None	32
Digital Output, TTL, Discrete Outputs	32	None	None	64
Pulse Counters	None	None	None	4

Illustrated in Appendix A, Figure 7

PSL-3 CONFIGURATION	LOCATIONS		
	A	B	C
PDP 11/34A Computer Interface	Required	None	None
Subsystem Chassis	Required	Required	Required
Subsystem Controller	Required	Required	Required
Class 1 Analog Input Equipment, Channels	256	None	None
Class 2 Analog Input Equipment, Channels	480	None	None
Digital to Analog Converters	16	None	None
Digital Inputs with Register, Discrete Inputs	64	32	64
Digital Inputs Sense with Bit Interrupt, Discrete Inputs	96	64	96
Digital Outputs, Relay, Discrete Outputs	32	16	32
Digital Outputs, TTL, Discrete Outputs	64	32	64
Pulse Counters	16	None	None

Illustrated in Appendix A, Figure 8

PSL-4 CONFIGURATION	LOCATIONS		
	A	B	C
PDP 11/34A Computer Interface	Required	None	None
Subsystem Chassis	Required	Required	Required
Subsystem Controller	Required	Required	Required
Class 1 Analog Input Equipment, Channels	256	None	None
Class 2 Analog Input Equipment, Channels	480	None	None
Digital to Analog Converters	16	None	None
Digital Inputs with Register, Discrete Inputs	64	32	64
Digital Input Sense with Bit Interrupt, Discrete Inputs	96	64	96
Digital Outputs, Relay, Discrete Outputs	32	16	32
Digital Outputs, TTL, Discrete Outputs	64	32	64
Pulse Counters	16	None	None

Illustrated in Appendix A, Figure 9

8X6 SWT CONFIGURATION	LOCATIONS			
	A	B	C	D
PDP 11/34A Computer Interface	Required	None	None	None
Subsystem Chassis	Required	Required	Required	None
Subsystem Controller	Required	Required	Required	None
Class 1 Analog Input Equipment, Channels	48	None	None	None
Class 2 Analog Input Equipment, Channels	240	None	None	None
Digital to Analog Converters	8	8	8	None
Digital Inputs with Register, Discrete Inputs	32	64	64	None
Digital Input Sense with Bit Interrupt, Discrete Inputs	64	96	96	None
Digital Outputs, Relay, Discrete Outputs	16	32	32	None
Digital Outputs, TTL, Discrete Outputs	32	64	64	None
Pulse Counters	4	4	4	None

Illustrated in Appendix A, Figure 10

9X15 LWST CONFIGURATION	LOCATIONS			
	A	B	C	D
PDP 11/34A Computer Interface	Required	None	None	None
Subsystem Chassis	Required	Required	None	Required
Subsystem Controller	Required	Required	None	Required
Class 1 Analog Input Equipment, Channels	None	None	None	None
Class 2 Analog Input Equipment, Channels	32	None	None	240
Digital to Analog Converters	8	8	None	8
Digital Inputs with Register, Discrete Inputs	32	64	None	64
Digital Input Sense with Bit Interrupt, Discrete Inputs	64	96	None	96
Digital Outputs, Relay, Discrete Outputs	16	32	None	32
Digital Outputs, TTL, Discrete Outputs	32	64	None	64
Pulse Counters	4	4	None	4

Illustrated in Appendix A, Figure 11

CLASS 1 ANALOG INPUT EQUIPMENT

The Class 1 Analog Input Equipment provides Neff Instrument Corporation Series 100 or 200 amplifier per channel analog equipment. Sample rates may be up to 50,000 samples per second. Input full scale ranges are (1) ± 5 mv., ± 10 mv., ± 20 mv., ± 50 mv., ± 100 mv. and ± 200 mv. or (2) ± 25 mv., ± 50 mv., ± 100 mv., ± 250 mv., ± 500 mv. or $\pm 1,000$ mv. Refer to the manufacturer's manual for further operating specifications.

CLASS 2 ANALOG INPUT EQUIPMENT

The Class 2 Analog Input Equipment provides Neff Instrument Corporation Series 400 analog equipment. Sample rates may be up to 10,000 samples per second. Input full scale ranges are ± 5 mv., ± 10 mv., ± 20 mv., ± 40 mv., ± 80 mv., ± 160 mv., ± 320 mv., ± 640 mv., and $\pm 1,280$ mv. Refer to the manufacturer's manual for further operating specifications.

ALL REMAINING INPUT AND OUTPUT DEVICES

Refer to the Neff Instrument Corporation Series 500 manuals for the following models:

Digital to Analog Converter	- 620540
Digital Input with Register	- 620560
Digital Input Sense with Bit Interrupt	- 620561
Digital Output, Relay	- 620531
Digital Output, TTL	- 620530
Pulse Counter	- 620562

2. IEEE 488 BUSS

The IEEE 488 buss is used to obtain data from the ESP subsystem, which is the other primary data acquisition source for Escort III. In addition to ESP, this IEEE standard buss structure can provide access to many commercially available devices.

3. FUTURE DEVICE SUPPORT

In addition to support over the IEEE 488 buss, other future device interfaces may utilize the spare EIA RS232 serial asynchronous ports, the special parallel input/output interfaces direct to the Unibus and even some of the Data Acquisition and Control Subsystem devices.

D. ALPHA-NUMERIC AND GRAPHIC DISPLAYS

1. Alpha-Numeric Display Subsystem

This subsystem provides the video CRT type displays that are the main point of contact for the test conductor to monitor the test progress and the data obtained during a run.

The subsystem configuration is illustrated in Appendix A, Figure 12. The main subsystem functional features include:

- a) Capacity to support 8 alpha-numeric displays
- b) rack mounted, fixed convergence, color TV monitors
- c) rack mounted raster scan display generation and subsystem control adjacent to host computer
- d) video data transmission from raster scan display generation to TV monitor with ability to remote the TV monitor up to 500 feet.
- e) subsystem control that interfaces to the PDP 11/34A host computer through a DR11-W DMA interface for 100,000 byte per second data transfer rate
- f) subsystem control and individual scan display generator capable of supporting 100,000 byte per second data rate
- g) return transfer of display data, on selected display basis, to host computer upon request
- h) available keyboard edit support with ability to remotely locate with TV monitor
- i) high speed display image copying, in shades of gray, shared among all 8 displays

The primary user control is provided through combination function button-entry panels, one for each video display, that are interfaced to the PDP 11/34A independent of this subsystem. The major subsystem features for each video display include:

- a) 80 characters per line
- b) 24 or 48 lines per display
- c) monochrome and 8 color alpha-numeric
- d) raster scan display generation
- e) 100,000 byte per second refresh memory update

- f) 50 Hz automatic refresh of display not dependent upon the host computer
- g) character blink
- h) character protect
- i) reverse background
- j) edit capability with available edit keyboard control
- k) cursor controls including absolute cursor addressing
- l) return transfer of display data to host computer upon request
- m) red, green, blue and RS170 composite video outputs to drive remote color TV monitor
- n) 96 standard ASCII characters
- o) character tab control, keyboard and host computer

2. Graphic Displays (future)

Computer support will be provided for five individual color graphic CRT displays.

Features of each color graphic CRT display may include:

- a) 640x480 pixel display
- b) 16 colors
- c) raster scan graphics
- d) microprocessor based image generation
- e) command language graphic generation
- f) pixel addressing
- g) alphanumerics, 80 characters per line and 24 lines per display
- h) 96 standard ASCII characters
- i) 30 Hz noninterlaced
- j) available keyboard
- k) red, green, blue and RS170 composite video outputs

1) RS170 drive sufficient for remote TV monitor and video copy device

Hard copy may be available as either of two features:

- a) An expensive color hard copy printer can be provided and shared among the five displays. Printing will require approximately two minutes, during which time the display must remain unchanged.
- b) A less expensive shades of gray copy can be provided in approximately 8 seconds. The RS170 video can be copied, and if a frame grabber is used, the display update may continue uninterrupted. The copy device may be shared with the Alphanumeric Display Subsystem.

E. INDIVIDUAL DIGITAL DISPLAYS

This feature provides the ability to single out important parameters and display them individually, as compared to a CRT that displays a set of parameters. An individual digital display provides a single 20 or 40 alphanumeric character line. Display data height is .5 inch for 20 characters and .3 inch for 40 characters. Cursor addressing allows label data to be fixed and update data to be inserted frequently.

An optional entry feature in conjunction with the display unit may provide feedback to the computer to select:

- 1. the parameter to be displayed
- 2. the type of data as:
 - a) raw data count
 - b) millivolt value
 - c) engineering unit value

The display units may be located individually or in clusters. Computer support will be provided through plugs that are daisy chained together to form a 4 wire serial communication buss. Display units include either self contained power supplies, that require a 110 VAC outlet, or will input DC voltages through the access plug. Display chains are supported at location A and remote locations B, C and D as defined in the Data Acquisition and Control Subsystem description.

Computer support to the display units is by serial asynchronous ASCII message communications. A daisy chain monitor determines from the message content whether the message applies to the particular display unit. With this structure, displays may be moved around as long as prewired plugs and AC or DC power are available. Computer support will provide display test and blanking health checks.

F. INPUT FUNCTION BUTTONS & ENTRY PANELS

This feature provides two separate categories of interface to the computer for interactive support:

1. discrete momentary contact closures
2. static numeric selection data

Input function buttons interrupt the computer through a double buffered structure specially designed to prevent any loss of random asynchronously generated contact closures. Separate access structures are located at location A and remote locations B, C and D. The user interface features are identical at each location. Each input has access to a reed relay coil. An input is energized by providing a momentary ground return to the reed relay coil. A single input may be energized by any number of parallel contact closures that provide a momentary ground return. The reed relay coil provides inherent protection from electrostatic and electromagnetic noise that could produce false interrupts.

Each function button input has available two return signal outputs that drive lamp drivers. The lamp drivers are controlled by the computer and provide a functional display in direct relation to the function button input.

Entry panels provide numeric keyboards for entering five digit decimal data into the computer. The entry panels provide a special case of the static numeric selection data. The numbers entered into the computer represent a special selection process. One example is the selection of images to be displayed on CRT's. The physical interface for the entry panels is the same one that supports the Individual Digital Displays. The interface consists of plugs that are daisy chained together to form a 4 wire serial communication buss. Plug chains are supported at location A and remote locations B, C and D. Entry panels include either self contained power supplies that require a 110 VAC outlet or will input DC voltages through the access plug.

Computer support for entry panels is by serial asynchronous ASCII message communications. A daisy chain monitor determines from the message content whether the message applies to the particular entry panel, interrogates the panel and returns the 5 digit number to the computer. With this structure, entry panels may be moved around as long as prewired plugs and AC or DC power are available.

Escort III requires a number of standard predetermined pushbutton and number entry applications. Special panel designs are available to provide the standard interface functions. Two panel sketches are illustrated in Appendix A, Figure 13. The panel designs do not preempt the standard functions from being located elsewhere or paralleling pushbutton functions.

G. OUTPUT CONTACT CLOSURES

This feature is supported through the Data Acquisition and Control Subsystem. The subsystem structure allows this feature to be available at location A and remote locations B, C and D. Terminal strips provide physical access to the contact closures.

1. The pertinent contact specifications include:

- a) register driven relays
- b) for C relay outputs, providing isolated 3 wire normally open and normally closed contacts
- c) contact rating, 20 watts at 1.5 amps or 200 volts D.C.

2. Computer support requirements include:

- a) 16 bit register loading of 16 contact closures simultaneously
- b) register verification by the computer

H. EVENT LOGGING

An event file (EVENT.LIS) will be started each time a user Logs in to a facility account. EVENT.LIS will be listed on the facility printer at any time by issuing the list events command LEVENT. (not available at this time)

All ESCORT III commands are logged on disk EVENT.LIS and on the Central ESCORT III console. Errors and other non-command events are, in generally, logged on disk EVENT.LIS, the central console, the facility operator's terminal. Some errors involved in interactive procedures are logged on the facility operator's terminal, only.

ESCORT III System messages have the general form:

>E3-ST-SM-TM-IN,L-TEXT

>E3 = message identifier as ESCORT III message

ST = task name

SM = software module name identifying source of message

TM = date and time

IN = identification number

L = severity level indicator

I = information

W = warning

E = error

F = fatal error

TEXT = error or information message, sometimes followed by NAK
(see Appendix B for lists of error messages)

Limit violation messages are logged on the log-and-alarm printer with date, time, and limit value block name. The optional log-and-alarm printer is a 480 line per minute thermal printer, driven over a serial asynchronous interface for operation remoted from the facility computer. Limit violation messages can also be obtained via the facility printer using the LDUMP command.

I. ON-LINE NEFF MULTIPLEXER CHANNEL CALIBRATION

Neff multiplexer (class 2) channels are periodically re-calibrated during the SCAN operation. The calibrations are initiated automatically; no command is issued to start them. The calibrations are controlled by the following system parameters, which can be changed by the E3PAR command:

SCAL = the number of scans between calibrations

MCAVG = the number of scans in the zero and span averages used in the calibration

NEFFCR = a switch (on or off) to control whether the calibration corrections should be applied when raw counts are converted to millivolts in SCAN

MCZERO = limit for zeroes in percent of full scale; out of limit values are flagged with an asterisk

MCSPAN = limit for spans in percent of full scale; out of limit values are flagged with an asterisk

The MCALIB command can be used to get a printout of the average zeroes and spans and calibration coefficients.

SPECIAL HARDWARE:

For each multiplexer channel chassis, there is a special calibration card of 16 channels. The card has voltage sources (7/8ths of full scale) for each of the selectable gain ranges and for zero mv. When these special channels are sampled, they read 7/8ths of full scale. Currently, there are up to two chassis in use. The calibration cards occupy the channel numbers as follows:

chassis 1	240-255
chassis 2	496-511

These channels may not be used for normal data sampling.

SOFTWARE PROCEDURE:

When the channel sampling list is constructed, calibration channels are automatically added to the list as they are needed for multiplexer channels in use. The upranging restriction on Neff multiplexer channels is accounted for in the addition process.

During on-line data monitoring (SCAN), a calibration is done at the beginning and every SCAL scans thereafter. During each scan, the calibration channels are sampled, as well as the normal data channels. At the start of the calibration, zero and span (7/8ths of full scale) counts are averaged over MCAVG scans. The calibration produces a pair of linear coefficients for each calibration channel. The coefficients are used to convert from raw counts to millivolts and thus correct the millivolts. The basis of the calibration is:

```

let      F = mv at 7/8ths full scale

          CF = average counts at 7/8ths full scale over MCAVG scans

          CZ = average counts at zero over MCAVG scans

          C = current counts

          MV = current millivolts

then     MV = F*(C-CZ)/(CF-CZ)
          = F*C/(CF-CZ) - F*CZ/(CF-CZ)

let      MV = K1*C + K0          (where K1 & K0 are linear coefficients)

then     K1 = F/(CF-CZ)

          K0 = -F*CZ/(CF-CZ) = -K1*CZ

```

A chassis may be at any one of the four locations A, B, C, or D. The MCALIB command will print the zeroes, spans, and coefficients during SCAN. The calibration channels may not be used for normal data sampling.

J. LIMIT CHECKING

The rules for how to do limit checking are kept in limit blocks that are created and modified by the limit check editor. A block can have up to three independent levels of limit checking, that is, three independent sets of limit check rules. The rules are given by assigning values to the parameters associated with a limit check level. The parameters are:

- a lower limit value (if needed)
- an upper limit value (if needed)
- up to four cform relay contacts to be closed on a limit violation
- up to eight actions to be taken on a limit violation a violation to occur and the number of consecutive successes to cause a violation to be removed

The three levels in one block allow for limit checking a data channel at different levels of severity. Data channels are associated with their limit blocks by setting the LM parameter in the channel editor to the name of the correct limit block. Calculated channels (performance calculations) may be limit checked the same way as sampled data channels.

Limit checking may be armed or disarmed (enabled or disabled) in several ways:

- By the setting of the system parameter LMCH to on or off. This parameter controls the state of arm or disarm only at the beginning of the SCAN command.
- By use of the arm and disarm pushbuttons during the SCAN operation. The pushbuttons cause all limit checks to be armed or disarmed.
- By the use of the LIMON and the LIMOFF commands. These commands arm and disarm individual channels or groups of channels. Groups of channels for limit check purposes are formed by setting the LG parameter for each desired channel in the channel editor. The LG parameter is set to a group number from 0 to 7. Channels with the same group number may be armed or disarmed as a group.
- The last arm or disarm change takes precedence over the previous state of arm or disarm. Thus, the LIMON and LIMOF commands can override the pushbutton settings and the pushbuttons can override the commands.
- Channels that are coded out are never limit checked.

On the CRT displays, channels with limit check violations are displayed in reverse video. On the IDD displays, channels with violations are flagged with a solid rectangle. Channels whose limit checking has been disarmed are flagged with an asterisk on both kinds of displays. Special limit-check-oriented displays can be created by use of the DISP command.

Whenever limit check violations occur or are cleared, a limit check message is generated. The message is sent to the alarm printer if the facility has one. The message is also written to a disk file which can be printed later on the logging printer by use of the LDUMP command. The system parameter LIMPR is set to on or off to indicate whether the facility has an alarm printer for limit messages. The format of a limit check message is:

TIME,IN/OUT,WORD,NAME,DATA,LIMIT,UP/LOW,LEVEL,(LOSS)

TIME	date and time
IN/OUT	shows coming in limits or going out of limits
WORD	word number of the data channel
NAME	name of the channel (subscripted)
DATA	data value of the channel
LIMIT	limit value
UP/LOW	shows an upper or lower limit
LEVEL	level number of the limit
(LOSS)	appears only if messages after this one were lost

It is possible to lose some limit messages if hundreds of them occur for a few scans of data. The earlier messages are preserved until the output devices can catch up with the number of messages being generated.

When the SCAN command is invoked:

- Limits are armed or disarmed depending on the setting of the system parameter LMCH. The light on the arm or disarm pushbutton is lit accordingly.
- The disk file of limit check violation messages is initialized.
- All the cform relay contacts are opened.

After SCAN acquires each scan of data, converts it to engineering units, and does the performance calculations on it; the following limit check operations are done:

- Check for arming or disarming of individual channels or groups of channels by the commands LIMON or LIMOFF.
- Check for pushbutton arm or disarm of all limit checking. If the pushbutton has been pushed, a message is sent to the terminal and the pushbutton light is lit.
- If a channel is coded out, it is not limit checked.
- The data channel value must be strictly less than the lower limit or strictly greater than the upper limit to be out of limits.
- A data channel must be out of limits N times in a row to cause a violation. A channel must be within limits N times in a row to clear a violation. N comes from the limit editor.
- On violations, switches are set to cause limit check actions if actions are specified in the limit block.
- If a violation has just occurred or has just been cleared, a limit check message is generated.
- Store up to 100 messages in a computer memory buffer for the alarm printer. If this buffer overflows, the last message in it is marked with the word LOSS.
- Store up to 200 messages in a computer memory buffer for the disk file of limits messages. If this buffer overflows, the last message in it is marked with the word LOSS.
- On violations, close cform relay contacts as specified in limit block.
- Send up to three limit check messages to the alarm printer, if the facility has an alarm printer. The presence of an alarm printer is indicated by the setting of the system parameter LIMPR.
- Write up to twenty messages to the limit check message disk file.
- Check the limit check action switches and do the actions.

K. COMMAND DESCRIPTIONS

1. PRE-RUN

E3INIT

Establishes a communications connection between the VAX supervisory computer and the PDP-11 facility computer and initializes tables (shouldn't use in SCAN)

FORMAT:

E3INIT

DESCRIPTION:

E3INIT tests the communications, initializes the scan list, sets the default display formats and other system defaults, and records a reference reading on the data collector.

STAT

Prints statistical noise check of all Neff and ESP channels (can't use in SCAN)

FORMAT:

STAT

DESCRIPTION:

STAT acquires several scans of data. It then computes a mean, min, max, standard deviation, umin and umax for each channel. The statistics are then sent to the facility printer. The number of scans and the reporting tolerances are system parameters changeable by the E3PAR command.

PNSAMP = number of samples in averages

PSTDW = limit for umin and umax in units of standard deviations;
out of limit values are flagged with an asterisk

CALIB

Performs pre-run calibration on Neff Class 1 channels (can't use in SCAN)

FORMAT:

CALIB

DESCRIPTION:

CALIB samples the Neff class 1 channels with known inputs (7/8 of full scale). CALIB then computes correction coefficients for use during real-time monitoring. A printout of the coefficients and associated statistics is also produced. Before a YES or NO reply is made to save the coefficients, the printout and any terminal error messages should be inspected. The EDC voltage standard must be in 'PROGRAM' mode.

The number of samples, report type, and tolerances are system parameters changeable thru the E3PAR command.

PNSAMP = number of samples for average zeroes and spans

PZEROA = limit for average zeroes in percent of full scale; out of limit zeroes are flagged with an asterisk

PSPAN A = limit for average spans in percent of full scale; out of limit spans are flagged with an asterisk

PSTDA = limit for umin and umax in units of standard deviations; out of limit values are flagged with an asterisk

REPORT = FULL or EXCP for exception reporting in the printout

NEFFCR = a switch (ON/OFF) to control whether the calibration corrections are applied when raw counts are converted to millivolts in SCAN

The full printout contains average zeroes and spans, the standard deviation, min, max, umin, umax, average counts for zeroes and spans, and the correction coefficients. Umin is the number of standard deviations that the min is away from the mean. Umax is the number of standard deviations that the max is away from the mean. Under exception reporting, the printout contains only channels that are flagged as out of limits.

SPECIAL HARDWARE:

There is a programmable EDC voltage standard that is connected to the channels by calibration relays. The relays are switched on and off by programmable TTL outputs. The voltage standard must be in 'PROGRAM' mode.

RESTRICTIONS:

The number of samples shall not exceed 15. This restriction protects against keeping the Neff calibration relay contacts on for more than five seconds. More than five seconds may cause overheating to produce inaccuracies.

The time between calibrations should be at least 8.3 minutes (500 sec). This time period allows the calibration contacts to cool down from the previous calibration.

SAVE

Defines the baseline run conditions to be the current conditons with respect to codeouts, substitutions, and forces

FORMAT:

SAVE

RESET

Resets the current run conditions to the baseline conditions

FORMAT:

RESET operation(s) (separated by commas)

CD = codeouts

SB = substitutions

FR = force functions

BPRINT

Prints the baseline run conditions with respect to codeouts, substitutions, and forces

FORMAT:

BPRINT

CPRINT

Prints the current run conditions with respect to codeouts, substitutions, and forces

FORMAT:

CPRINT

SIMRUN

Simulates real-time monitoring with stored data from known test conditions

FORMAT:

SIMRUN (INTERVAL)

PARAMETERS:

INTERVAL = Optional parameter used to set the scan time interval. INTERVAL is input as a decimal number in units of seconds. The DEFAULT scan interval is one second.

DESCRIPTION:

The SIMRUN command starts all real-time monitoring functions. The System performs the same as if the SCAN command had been entered. The simulation data is acquired from a previous run by copying the history file into the simulation data file. SIMRUN will continue until terminated by the STS command.

2. REAL-TIME MONITORING

GENERAL:

The commands, LIMON, LIMOFF, COUT, CIN, SUBS, and FORCE, may either be given alone or with the parameter(s) desired. If given alone, a prompt will be given for the parameter(s) requested.

SCAN

Starts real-time monitoring of system

FORMAT:

SCAN (INTERVAL)

PARAMETERS:

INTERVAL = Optional parameter used to set the scan time interval. INTERVAL is input as a decimal number in units of seconds. The DEFAULT scan interval is one second.

DESCRIPTION:

The SCAN command starts all Real-Time Monitoring functions. Functions activated are:

DATA ACQUISITION

LIMIT CHECKING

PERFORMANCE CALCULATIONS

REAL-TIME DISPLAYS

HISTORY FILE WRITE

DATA RECORDING ACTIVATION

Contact Interrupts (pushbuttons) are available to:

- 1) record
- 2) cyclic record
- 3) playback step
- 4) freeze history file #1
- 5) unfreeze history file #1
- 6) freeze history file #2
- 7) unfreeze history file #2
- 8) freeze history file #3
- 9) unfreeze history file #3

Real-Time Monitoring will continue until terminated by the STS command.

STS

Stops Real-Time Monitoring of System (stops SCAN, PLAYBACK, and SIMRUN)

FORMAT:

STS

MCALIB

Prints the coefficients for the dynamic calibration of Neff multiplexer channels (must be in SCAN)

FORMAT:

MCALIB

DESCRIPTION:

The Neff multiplexer channels are periodically recalibrated during real time monitoring. MCALIB causes a printout of the zeroes, spans and coefficients of the latest calibration.

LIMON

Arms channels or groups of channels for limit checking (must be in SCAN)

FORMAT:

LIMON channel id(s)

PARAMETERS:

CHANNEL ID or limit group number:

channel name

channel number

NA = channel name

CH = channel number

WD = word number

LG = limit group number (0-7)

DESCRIPTION:

Selectively turns on the limit checking for given channel names or numbers, word numbers, and/or limit groups.

LIMOFF

Disarms channels or groups of channels for limit checking
(must be in SCAN)

FORMAT:

LIMOFF channel id(s)

PARAMETERS:

CHANNEL ID or limit group number:

channel name

channel number

NA = channel name

CH = channel number

WD = word number

LG = limit group number (0-7)

DESCRIPTION:

Selectively turns off the limit checking for given channel names or numbers, word numbers, and/or limit groups.

COUT

Codes out channels (codeout symbol is H, follows parameter)

FORMAT:

COUT channel id(s) (separated by commas)

PARAMETERS:

CHANNEL ID

EXAMPLES:

4003	(single channel number)
4002-4004	(simple band of channels)
WD=22	(word number)
WD=21-25	(band of word numbers)
PNORM	(channel name)
PTREF(3)	(subscripted name)
TTORF(1-6)	(band of subscripts)

CIN

Reactivates a previously coded-out channel (removes H symbol)

FORMAT:

CIN channel id(s) (separated by commas)

PARAMETERS:

CHANNEL ID ...or CH=ALL (for all channels)

EXAMPLES:

4003	(single channel number)
4002-4004	(simple band of channels)
WD=22	(word number)
WD=21-25	(band of word numbers)
PNORM	(channel name)
PTREF(3)	(subscripted name)
TTORF(1-6)	(band of subscripts)

STDUMP

Invokes a status dump of all channels

FORMAT:

STDUMP

DESCRIPTION:

A status dump is a snapshot of one scan of data. The printout contains the engineering unit values of all the sampled channels and the values of all the calculations. Optionally, the printout can also include raw counts and millivolts. These options are system parameters changeable through the E3PAR command.

CHAN	NAME	VALUE	TAG	CHAN	NAME	VALUE	TAG
4001	TESTV	0.459272E+02		4051	KU (003)	0.363949E-01	
4002	THEAT	0.284018E+00		4052	KU (004)	0.785432E+03	
4003	HEATER	0.738193E+01		4053	KU (005)	0.1522478+01	
4004	SECDR1	0.6835261-04		4054	KU (006)	0.895562E+00	
4005	VALVE	0.289385E-02		4055	KU (007)	0.452786E-02	
4006	FLEXW	0.562901E+00		4056	KU (008)	0.245875E-03	
4007	TT07	0.365095E+02		4057	KU (009)	0.683459E+02H	
4008	TT08	0.2080052+02		4058	KU (010)	0.532784E-01	

RDUMP

Invokes a research dump

FORMAT:

RDUMP

DESCRIPTION:

RDUMP does a printout of selected variables. The number and format of the variables are agreed upon by the engineer and the programmer.

LDUMP

Invokes a dump of all limit check messages

FORMAT:

LDUMP

DESCRIPTION:

LDUMP prints the disk log file of all of the limit check messages on the facility printer.

SUB

Substitutes one channel for another

FORMAT:

SUB a,b,c,d,etc.

PARAMETERS:CHANNEL ID:

channel name

channel number

NA = channel name

CH = channel number

WD = word number

DESCRIPTION:

Channel a replaces channel b, channel c replaces channel d, etc. The substitution is done at the engineering unit level. Up to 100 substitutions may be made.

UNSUB

Removes the substitution of one channel for another

FORMAT:

UNSUB a,b,etc.

PARAMETERS:

CHANNEL ID ...or CH=ALL (for all channels)

channel name

channel number

NA = channel name

CH = channel number

WD = word number

DESCRIPTION:

The substitution for channel a and the substitution for channel b are removed.

FORCE

Forces a channel to have a specified value

FORMAT:

FORCE a,value,b,value,etc.

PARAMETERS:

CHANNEL ID:

channel name

channel number

NA = channel name

CH = channel number

WD = word number

DESCRIPTION:

The value following channel a replaces the engineering units for channel a. The value following channel b replaces the EU for channel b. Up to 100 forces may be made.

UNFORCE

Removes the force of a specified value for a channel

FORMAT:

UNFORCE a,b,etc.

PARAMETERS:

CHANNEL ID ...or CH=ALL (for all channels)

channel name

channel number

NA = channel name

CH = channel number

WD = word number

DESCRIPTION:

The force of a specified value for channel a and the force of a specified channel for channel b are removed.

3. CHANNEL EDITING

INTERACTIVE USAGE

The commands CHAN, COEF, DISP, LIMIT and PARAM are interactive editor-type commands. They establish a dialogue with the user. Whenever the editing and operating commands are given together on the same line, the user is returned to the nonediting mode after completing the editing function. However, when the editing and operating commands are entered separately, the user remains in the editing mode after completing the editing function and is prompted for another operation command.

CHAN, DISP and LIMIT work on lines of information. The lines consist of parameters or values separated by commas. The values are identified by 2-letter keywords such as XX=value. When a keyword has more than one value, they are enclosed in parantheses as XX=(value,value...). They can also be identified positionally by the order in which they appear in the standard format of a line.

CHAN

Edits parameters associated with sampled and calculated channels. Calculated channels are included in the edit lists so that they can be limit checked and displayed the same way as sampled channels. Editing is done in a conversational manner.

FORMAT:

CHAN operation,channel id

EDIT OPERATION COMMANDS:

A = ADD new channels to the end of the list

I = INSERT new channels into the list

C = CHANGE one or more parameters associated with an existing channel or variable (CHANGE displays the current parameters, prompts for changes, and then displays the updated parameters)

R = REVIEW displays the current parameters for a band of channels or variables

P = PRINT all sampled and calculated channels on the facility printer

CN = CHANGE WITH NO REVIEW changes the parameters associated with a band of channels or variables (CHANGE WITH NO REVIEW is intended for the more experienced user)

D = DELETE channels or variables from the list

F = FILE edit changes to disk in order to prevent loss in case of a system crash (not available at this time)

? = Explain the required response

/ = End the channel editing session

(CR) End the present phase of response

WARNING: The ADD, INSERT, DELETE, and CHANGE-name commands should not be used without consulting the programmer. Otherwise, serious errors in calculations may occur.

GENERAL

During the SCAN operation, ADD, INSERT, and DELETE are not permitted. The channel number may be a single channel number, a simple band, or a discontinuous band of channel numbers. All of the parameters except the channel number and the gain for sampled new channels may be defaulted. The channel number must precede all of the positional parameters except the name. The channel number indicates whether the channel is sampled or calculated. If the new channels are named the same as the previous array or are not named at all, they are appended to the previous array. New channel names do not need and may not have subscripts, since the program will assign them. A subscripted name associated with a band of channels is incremented as the band is expanded.

KEYWORDS:

NA = channel or variable name up to six characters, a subscript up to three digits is optional. The first character must be alphabetic.

CH = channel number four to five digits. The two high order digits indicate the type and location of the data source. Calculated variables also are assigned a channel number (see paragraph on CHANNEL NUMBERS in this section).

WD = word number, the order in which channels appear in the list. Can be used for positioning to channel information to be edited. Word numbers can only locate channels, they cannot be assigned.

RA = gain range setting in millivolts or ESP counts per psi.
Neff gain settings are:

Class 1: 5,10,20,50,100,200,500,1000 mv.

Class 2: 5,10,20,40,80,160,320,640,1280,2560,5120,10240 mv.
(for class 2 channels only, there is a restriction on decreasing the gain setting for consecutive channels by more than five steps)

EU = name of engineering unit conversion rule (up to six characters)

= XXXXXX the name of a coefficient block defined by the COEF command

= a reserved name for commonly used rules

= IDN identity conversion (no conversion)

= ESP for ESP channels

= TX150F type X thermocouple with 150 °F reference

= TX32F type X thermocouple with 32 °F reference

= TXFLT type X thermocouple (floating reference)

where type X is either E, J, K, R, or T

E = nickel-chromium alloy versus a copper-nickel alloy-chromel constantan

J = iron versus a copper-nickel alloy-I/C iron constantan

K = nickel-chromium alloy versus nickel-aluminum alloy-C/A chromel alumal

R = platinum-13% rhodium versus platinum

T = copper versus a copper-nickel alloy-I/C copper constantan

PC = name of post-conversion calculation (2 characters)

= BA add barometer to engineering units

= FA convert temperature to °F

= RA convert temperature to °R

= CE convert temperature to °C

= KE convert temperature to °K

= NO no post-conversion

CD = codeout indicator

= Y for codeout

= N for no codeout

RF = reference channel name for floating reference thermocouples and marker channel for multi-range instruments

LM = name of limit check rule (up to six characters)

= XXXXXX the name of a limit check block defined by the LIMIT command

= NONE no limit check

LG = limit check group number for selectable limit checking on groups of channels (each limit check group may be selectively turned on or off)

= 0 to 7

DEFAULTS:

EU = IDN

PC = NO

CD = N

RF = NONE

LM = NONE

LG = 0

POSITIONAL ORDER:

The positional order for entry for information associated with channels and variables is:

NA=TTORF(3),CH=4003,RA=10,EU=TT150F,PC=FA,CD=N,RF=NONE,LM=XYZ,LG=0

or TTORF(3),4003,10,TT150F,FA,N,NONE,XYZ,0

RESTRICTION: If keywords are not used, all parameters must be in the sequential order shown above, using commas if any parameters are to be omitted. If keywords are used, the channel number must precede all parameters except the item name. Each time a keyword is used, the position is reset and the following non-keyword parameters must be sequential unless another keyword is given.

CHANNEL ID

The CHANNEL ID identifies the channel or channels to be changed or deleted. The CHANNEL ID may be a word number, a channel name, or a channel number. It may also be a simple band of word numbers, channel name subscripts, or channel numbers. A number without a keyword is assumed to be a channel number. If the CHANNEL ID is a channel number, only the first occurrence of the channel in the channel lineup is operated on. If a channel appears more than once, it must be identified by the word number or subscripted name. The only restriction on the order of channels that appear in the channel lineup is that all the calculated channels must follow all the sampled channels.

EXAMPLES:

4003	(single channel number)
4002-4004	(simple band of channels)
WD=22	(word number)
WD=21-25	(band of word numbers)
PNORM	(channel name)
PTREF(3)	(subscripted name)
TTORF(1-6)	(band of subscripts)

INSERT

The CHANNEL ID points to the word before the intended insertions. In order to insert at the beginning of the list, use WD=0. If the new channels are named the same as the following array, they become the beginning of the following array. The insertion of new names must not attempt to split an existing array in two.

CHANGE

The changed channel number may only be a single channel or a bands of channels. For a band, the channels are operated on one at a time. If the changed channel is named the same as the previous array, it is appended to the previous array. If the changed channel is named the same as the following array, it becomes the beginning of the following array. Changes to channel names must not attempt to split an array in two. On any change, any or all of the parameters following the word number may be changed to different names, numbers, or conditions.

CHANGE WITH NO REVIEW

For the more experienced user who does not wish to see the channel listing printed as changes are made, the CHANGE WITH NO REVIEW may be implemented. When using this command, both the CHANNEL ID and the changes should be given together. The changed channel number may be a single channel, a simple band, or a discontinuous band. Up to 999 channels may be changed in one band. If the band of new channels is longer than the number of channels being changed, the excess is ignored. If the band of new channels is shorter, the last channel is repeated.

DELETE

DELETE does not actually occur until the DELETE operation is terminated. This is done to avoid the confusion of word numbers changing during the operation.

BANDS

In a band of channels, the device number portion of the channel numbers must be the same. For a band of channels, the channels are selected irrespective of the order in which they appear in the channel lineup. Channels are not assumed to be in any particular order in the lineup. An error in a band of channels, word numbers, or names causes the whole band not to be processed. Discontinuous bands are used for new channel numbers only. There may be up to 10 items separated by comas and enclosed in parentheses. Calculated channels and sampled channels may not be mixed in a discontinuous band.

EXAMPLES:

NA = ABCD(1-5)	(simple band)
CH = 4000-4007	" "
CH = (1,4-6,8,16)	(discontinuous band)

CHANNEL NAMES

The channel names may be up to six characters long and must start with an alphabetic character. The names may be subscripted from 1 to 999 to form an array and all channel elements in the array must be contiguous.

CHANNEL NUMBERS

A system of channel numbers has been worked out to identify the type of device being used and its location in the facility. The three low-order digits (XXX) are the channel number normally associated with the device. The one or two high-order digits indicate device type and location as follows:

1XXX	Neff Class 1 analog	Location A
2XXX	Neff Class 1 analog	Location B
3XXX	Neff Class 1 analog	Location C
4XXX	Neff Class 1 analog	Location D
5XXX	Neff Class 2 analog	Location A
6XXX	Neff Class 2 analog	Location B
7XXX	Neff Class 2 analog	Location C
8XXX	Neff Class 2 analog	Location D
9XXX	ESP subsystem (first)	
10XXX	ESP subsystem (second)	
11XXX to		
13XXX	Reserved	
14XXX	Digital input	
15XXX	Pulse Counters	
16XXX to		
80XXX	Reserved	
81XXX to		
84XXX	Digital output form 'C' relay	
85XXX to		
88XXX	Digital output TTL	
89XXX to		
92XXX	Digital-to-analog output	
93XXX to		
94XXX	Reserved	
95XXX to		
99XXX	Calculations	

SAMPLED AND CALCULATED CHANNELS

The parameters for a channel or calculation are organized as one line in a file. The channels may be entered in any order, but it is recommended they be grouped by device type. The channels will actually be sampled by device type. The calculated channels appear after the sampled channels. The channel and variable names are used by the display editor command DISP to specify values to be displayed.

A printout of all the sampled and calculated channels appears as follows:

SAMPLED CHANNELS

WORD NUMBER	CHANNEL NAME	CHANNEL NUMBER	GAIN/ RANGE	E.U. CONV	POST CONV	CODE -OUT	REFERENCE CHANNEL	LIMIT CHECK	LIMIT GROUP
1	TESTMV	4001	50 MV	IDN	NO	N	NONE	NONE	0
2	VMU	4002	50 MV	CO2	NO	N	NONE	NONE	0
:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:
100	SPAR58(43)	4100	50 MV	IDN	NO	N	NONE	NONE	0
101	ESP (1)	9001	1000 PSI	IDN	NO	N	NONE	NONE	0
102	ESP (2)	9002	1000 PSI	IDN	NO	N	NONE	NONE	0
:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:
456	ESP (356)	9356	1000 PSI	IDN	NO	N	NONE	NONE	0

CALCULATED CHANNELS

WORD NUMBER	CHANNEL NAME	CHANNEL NUMBER	CODE -OUT	LIMIT CHECK	LIMIT GROUP
457	RUN	95001	N	NONE	0
458	BATCH	95002	N	NONE	0
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
562	RDG	95107	N	NONE	0

PROMPTS:

ENTER EDIT OPERATION >>

The previous edit operation is finished. Select another one or default (carriage return) for end of editing session.

ENTER NEW CHANNELS

>>

New channels or calculations are being added or inserted to the list. The new line must include a channel number and a gain range setting. The other parameters on the line may be defaulted. Parameters are entered by keyword, positionally, or both:

NA=PRES,CH=4003,GA=10,EU=ABCD

(by keyword)

PRES,4003,10,ABCD

(positionally)

PRES,4003,EU=ABCD

(positionally and by keyword)

ENTER PRECEDING CHANNEL ID >>

Used only with INSERT command, determines what channel number will be followed by the inserted channels.

ENTER CHANNEL ID >>

The CHANNEL ID identifies the channel at which editing will be done. The CHANNEL ID may be a channel name, a channel number, or a word number. A number is assumed to be a channel number.

ENTER CHANGES >>

Parameters associated with a channel's line of information are displayed by the computer and the user may then change any or all of the parameters, except the word number.

ENTER CHANNEL ID,CHANGES

>>

For use only with the CHANGE WITH NO REVIEW command, both the CHANNEL ID and the changes are entered on the same line.

EXAMPLES:

The \$ and >> and any information preceding the >> are responses entered by the central computer. Any information following the >> is by the user entered on the central terminal. If there is no information shown on the line after the >>, the user entered a carriage return.

Enter CHAN editing:

\$ CHAN

14-SEP-83 11:01:22

ENTER EDIT OPERATION >>

Add new channels:

```

ENTER EDIT OPERATION >> A
ENTER NEW CHANNELS
>> ,4101,10
>>
LAST WORD NUMS ARE 457 (SAMPLED) AND 563 (CALCS)
ENTER EDIT OPERATION >>

```

Insert new channels:

```

ENTER EDIT OPERATION >> I
ENTER PRECEDING CHANNEL ID >> 4100
ENTER NEW CHANNELS
>> TEST,4103,10
>> ,4105,10
>> ,4104,10
>> ,4102,10
>> ,4101,10
>>
5 CHAN(S) INSERTED, WORD NUMS RESEQUENCED AS NEEDED
ENTER PRECEDING CHANNEL ID >>
ENTER EDIT OPERATION >>

```

Change information for a channel:

```

ENTER EDIT OPERATION >> C
ENTER CHANNEL ID >> 4003
3,NA=RUNCD3,CH=4003,RA=10,EU=IDN,PC=NO,CD=N,RF=NONE,LM=NONE,LG=0
ENTER CHANGES >> RA=50
3,NA=RUNCD3,CH=4003,RA=50,EU=IDN,PC=NO,CD=N,RF=NONE,LM=NONE,LG=0
ENTER CHANNEL ID >>
ENTER EDIT OPERATION >>

```

Change information for a channel (alternate form):

```

ENTER EDIT OPERATION >> C,4003
3,NA=RUNCD3,CH=4003,RA=10,EU=IDN,PC=NO,CD=N,RF=NONE,LM=NONE,LG=0
ENTER CHANGES >> ,,,,Y
3,NA=RUNCD3,CH=4003,RA=10,EU=IDN,PC=NO,CD=Y,RF=NONE,LM=NONE,LG=0
ENTER CHANGES >> ,,50,CD=N
3,NA=RUNCD3,CH=4003,RA=50,EU=IDN,PC=NO,CD=N,RF=NONE,LM=NONE,LG=0
ENTER CHANGES >> /
$

```

Review one or more channels:

```

ENTER EDIT OPERATION >> R
ENTER CHANNEL ID >> 4100-4105

```

```

100,NA=SPAR58(43),CH=4100,RA=50,EU=IDN,PC=NO,CD=N,RF=NONE,LM=NONE,LG=0
105,NA=TESTA(5),CH=4101,RA=10,EU=IDN,PC=NO,CD=N,RF=NONE,LM=NONE,LG=0
104,NA=TESTA(4),CH=4102,RA=10,EU=IDN,PC=NO,CD=N,RF=NONE,LM=NONE,LG=0
101,NA=TESTA(1),CH=4103,RA=10,EU=IDN,PC=NO,CD=N,RF=NONE,LM=NONE,LG=0
103,NA=TESTA(3),CH=4104,RA=10,EU=IDN,PC=NO,CD=N,RF=NONE,LM=NONE,LG=0
102,NA=TESTA(2),CH=4105,RA=10,EU=IDN,PC=NO,CD=N,RF=NONE,LM=NONE,LG=0
ENTER CHANNEL ID >> WD=100-102
100,NA=SPAR58(43),CH=4100,RA=50,EU=IDN,PC=NO,CD=N,RF=NONE,LM=NONE,LG=0
101,NA=TESTA(1),CH=4103,RA=10,EU=IDN,PC=NO,CD=N,RF=NONE,LM=NONE,LG=0
102,NA=TESTA(2),CH=4105,RA=10,EU=IDN,PC=NO,CD=N,RF=NONE,LM=NONE,LG=0
ENTER CHANNEL ID >>
ENTER EDIT OPERATION >>

```

Change information for channels with no review:

```

ENTER EDIT OPERATION >> CN
ENTER CHANNEL ID,CHANGES
>> 4003,TEST
>> WD=56,RA=30
>> TTORF,CD=Y
>>
ENTER EDIT OPERATION >>

```

Delete one or more channels: (Use only with extreme caution!!)

```

ENTER EDIT OPERATION >> D
ENTER CHANNEL ID >> TESTA(1-3)
ENTER CHANNEL ID >>
      3 CHAN(S) DELETED. WORD NUMS RESEQUENCED AS NEEDED
ENTER EDIT OPERATION >>

```

COEF

Edits polynomial conversion coefficient blocks used to convert millivolts to engineering units

FORMAT:

COEF operation,block name

BLOCK NAME

The block name is the name of a new block or set of polynomial coefficients. The name is up to six characters long and must start with an alphabetic letter. A block may have up to 20 segments and up to 20 coefficients per segment.

BREAKPOINTS

Breakpoints can be used to break the domain of millivolts into segments, (n-1) breakpoints for n segments. Each segment has its own set of polynomial coefficients. The coefficients are in descending power order as in:

$$C2 (MV)^2 + C1 (MV) + C0$$

EDIT OPERATION COMMANDS:

A = ADD new coefficient blocks
 C = CHANGE a coefficient block
 R = REVIEW a coefficient block
 P = PRINT a listing of all coefficient blocks on the facility printer
 D = DELETE coefficient blocks
 ? = Explain required response
 / = End the coefficients editing session
 (CR) End the present phase of response

EXAMPLES:

Enter COEF editing:

```
$ COEF
14-SEP-83 09:39:49
ENTER EDIT OPERATION >>
```

Add a new coefficient block:

```
ENTER EDIT OPERATION >> A,ABCD
ENTER NUMBER OF SEGMENTS >> 2
ENTER NUMBER OF COEFFICIENTS >> 3
BREAKPOINT 1 = >> 1.0
SEG 1 C 2 = >> 1.0
SEG 1 C 1 = >> 2.0
SEG 1 C 0 = >> 3.225E5
SEG 2 C 2 = >> 4.0
SEG 2 C 1 = >> 5.0
SEG 2 C 0 = >> 6.0
ENTER BLOCK NAME >>
ENTER EDIT OPERATION >>
```

Change the values in a coefficient block:

ENTER EDIT OPERATION >> C,ABCD

```

ABCD          2 SEGMENT(S)          3 COEF(S)/SEGMENT
BRKPT 1 =    1.00000    >>
SEG 1  C 2 =    1.00000    >>
SEG 1  C 1 =    2.00000    >> 8.0
SEG 1  C 0 =   322500.    >>
SEG 2  C 2 =    4.00000    >> 9.0
SEG 2  C 1 =    5.00000    >> /
$

```

Review the values in a coefficient block:

ENTER EDIT OPERATION >> R,ABCD

```

ABCD          2 SEGMENT(S)          3 COEF(S)/SEGMENT
BRKPT(S):     1.00000
SEG 1:    1.00000      8.00000      322500.
SEG 2:    9.00000      5.00000      6.00000
ENTER BLOCK NAME >> C19

C19          7 SEGMENT(S)          1 COEF(S)/SEGMENT
BRKPT(S):     6.10000      10.1000      14.1000      18.1000      22.1000
                26.1000
SEG 1:    1.00000
SEG 2:    2.00000
SEG 3:    3.00000
SEG 4:    4.00000
SEG 5:    5.00000
SEG 6:    6.00000
SEG 7:    7.00000
ENTER BLOCK NAME >>
ENTER EDIT OPERATION >>

```

4. DISPLAY EDITING

ALPHANUMERIC DISPLAY EDITING

The following is a description of the interactive display editing commands. As referred to in this manual, a display is either a page of alphanumeric output formatted for a CRT display screen or single items formatted for an IDD (individual digital display). The display editor DISP supports interactive editing on the VAX of files of CRT display pages and files of IDD information. The format of these files also allows a context editor to be used for editing of display information directly.

DISP

Creates a new alphanumeric display or modifies an existing one for a CRT or an IDD set

FORMAT:

DISP function, display page or IDD set number

DISPLAY EDITING FUNCTIONS (editing)

TE = ENTER or EDIT the fixed format text for a display page

DA = ENTER or EDIT the data (item name or number, location, format, etc.) for a display page

AT = ENTER or EDIT the text attributes by location for a display page

LT = ENTER or EDIT limit data for a display page

DD = ENTER or EDIT data and text for an IDD set

FORMAT:

DISP function, type, display page or IDD set number

DISPLAY EDITING FUNCTIONS (data management)

CP = COPY a display page or an IDD set

ER = ERASE a display page or an IDD set

CK = CHECK a display page or IDD file

DISPLAY PAGES	LIMIT AREAS	IDD SET NUMBERS
1 to 255	1 to 255	1 to 9
DISPLAY TYPE	LIMIT AREA TYPE	IDD SET TYPE
PG	LA	DS

NOTE: A total of 255 display pages are permitted, however, display pages 225 through 255 are reserved for special use and are not to be changed by the user. Pages 240 through 249 display word numbers 1 through 1000. Page 1 is normally used as a current directory listing what is on the following pages for a given run.

SELECTION OF DISPLAY PAGE FORMATS FOR CRT'S

The set of display page formats to be output to the CRT's at the initialization of the ESCORT III task is specified in the E3PAR file. During real-time, a display page format is changed by selecting a display page number with the entry panel on the CRT and depressing the DISPLAY button. A set of display page formats may also be assigned to the function buttons associated with one of the CRT's. A display page format may be assigned to one of each of the function buttons (1-15) by selecting the function button number followed by the display page number on the entry panel and then depressing the ENTER button. Display page formats may be assigned to these function buttons at any time. Since assignments are stored permanently in the VAX, it is not necessary to reassign function buttons for each initialization. Function button 16 provides the HELP function, a display of the display page numbers currently assigned to the function buttons for a given CRT. Display page 255 has been reserved for this function and should not be modified.

TEXT FOR A DISPLAY PAGE

The text for any one display page is initially a blank picture 24 lines by 80 columns in normal size and 48 lines by 80 columns in reduced size. Text is displayed on a CRT by location; a line and column is specified to indicate the start of the text to be input. Text can be entered at any column, but cannot exceed 80 characters. Lines are numbered 1 to 48, with 1 (1 to 2, if normal size) reserved for the fixed header. Normal character size text may only be specified on the odd numbered lines; the reduced size may be defined for lines 2 to 48.

DATA ITEMS FOR A DISPLAY PAGE

Items to be displayed are identified by sequence: item name/channel number/word number, line, column, format, and attributes such as size, color, and intensity. Odd numbered lines must be used for data as well as text for the normal size display page format. Sequence is the order that the items are presented for display on the screen and also the order in which they are stored in the display files. A sequence number is used as identification with a function to select items to be edited. The default for the item, when a number for the item parameter is entered without a keyword, is the channel number. Item names may refer to sampled or calculated data. The arrays of output resulting from banding of channels or words will be displayed in rows across the screen. Line and column refer to position on the display screen. The position specified with an array is the location associated with the first array element. The tag and limit check flag require two additional characters for output, therefore, the user must consider these when defining the page formats.

Automatic positioning of data items on a display page is activated when the line, column, and format are not specified for the first item on that page. The format for output of all data items is G11.4. An array will be displayed three elements per line; single items preceding or following an array will be output on a new line. Data items are automatically labeled with the item name. Automatic positioning remains in effect for a display page only until a line, column, or format is specified and then may not be reactivated for that page.

DATA ITEM LABELING

Displays may be defined in two forms: 1) the standard display of items, where text must be used for defining any required labeling; and 2) automatic labeling, where items may be displayed with the name of the item as the label. In the DA function, the data item may be labeled by adding a /* or /text to the item name, channel, or word number. The /* indicates to the system that the name of the item to be displayed is to be used as the label. The /text allows the user to select the text for the label. Labels are 12 characters in length and are immediately to the left of the variable value. When specifying the column, CL, the column position is always the location of the data, not that of the label.

DISPLAY PAGE ATTRIBUTES

Attributes, such as color, size, and intensity, may be selected for both text and data values. The selection of the attributes for the text may be specified either in the E3PAR.EDIT file or using the AT function. Text attributes are in effect for all text until changed by a following positional sequence. If an attribute is not made, a default value is assumed. The attribute selection is also in effect for all the data values (using the DA function) on the display page unless an attribute is specifically set for an item. Attributes may be selected for data values on a per item basis. When an attribute is specified for an item, that attribute will hold for the following items or until a new attribute is specified with a later item. The item attribute will be the same for the data value, the tag, and the limit check flag, when present. The attribute selected will also apply to the label if the variable has been specified with the name as the label.

BAR GRAPHS

A bar graph of preselected parameters may be formed by using the BG function. A fixed area is provided between columns 15 and 75 and between lines 9 and 39. The vertical bars may be either double width (normal size) for a maximum of 30 bars, or single width (reduced size) for a maximum of 60 bars. The column for each bar may either be specified or determined by the system. Labeling of each bar with the current value is optional, however, a minimum and maximum value must be specified for the Y axis labeling. Colors may be selected for each bar, however, red is reserved for data items that are beyond the limits. Text may be added to the graph using the TE function. Standard display output and LIMITS data will be ignored.

BLOCK DISPLAY OF LIMITS ON CRT'S

The function LI is available in the DISP editor to provide a block display of data items which have exceeded a limit as defined with the channel editor. Data items to be output are entered when the display page format is defined. During run-time if any item exceeds one of the limits associated with that item, the data and the limit exceeded for that item will output in an area reserved for these items. The LI function is used to define the set of data items to be output to the block and the size of the area to be allocated to the block within the display page format. Data items for the block are entered by name and subscripts, single or multiple. The name *ALL may be used to indicate that all of the limited data be scanned for limits exceeded, rather than a specified set.

INDIVIDUAL DIGITAL DISPLAYS

The individual digital displays (IDD's) must be specified using the DD function in the display editor. A maximum of 255 IDD entries per IDD set may be specified, with multiple specifications for each IDD allowed. A sequence number will be associated with each IDD entry or line of input in the IDD files. As with the displays, the name/channel/word specified with the IDD is not used as the label. Labeling is specified as for data items on a display page. A text parameter TX may be used to define text up to the maximum number of characters available with IDD's, either 20 or 40 characters. Text is positioned at column 1 unless the position is specified using TL. Arrays are not supported on the IDD's; multiple single item requests must be made to display more than one item on a single IDD. CL is used to assign the starting location of the item value on an IDD.

EDIT OPERATION COMMANDS:

- A = ADD text or sequence
- I = INSERT sequence (cannot be used with function TE)
- C = CHANGE WITH REVIEW part or all of a line or sequence
- CN = CHANGE WITH NO REVIEW part or all of a line or sequence
- B = BLANK out line(s) from current CL to last column (function TE only)
- M = MOVE line(s) from current CL to last column (function TE only)
- D = DELETE text or sequence
- R = REVIEW text or sequence
- F = FILE the current version of the file
- P = PRINT the display page on the facility printer
- PT = PRINT the display page on user's terminal

? = Explain the required response

/ = End the display editing session

(CR) End the present phase of response

SKIP is inserted in the text by the DISP editor when the display page is rewritten, either when a file command is issued or at the termination of editing. A default of one of more of the items in a sequence such as line, column, format, or any of the attributes, i.e., not specifying the parameter, will automatically assign these items to the previously defined values, but not until the display page is called up for output to a CRT. The defaults, therefore, are assigned in the previous sequence. The defaults for line, column, format, and attribute for the initial input are line = 1, column = 1, format = G11.5, and attribute = as set in a parameter file. The column for text editing TE is reset to column 1 at start of a new operation. An item name or number is always required when specifying a data item in the DD and DA functions. The number of the individual digital display (IDD) must also be specified in the DD function. A change may be made to any one parameter of a display or IDD sequence without affecting the other parameters in that sequence. The entire file is updated after each operation and a backup file is maintained for use in real-time when the current file is in error.

KEYWORDS:

SQ = sequence number (used only in interactive editing, not stored in file)

ID = IDD number, 1 to 240

NA = channel name, 6 character variable, 3 digit subscript

CH = channel number, default parameter, 5 digit number

WD = word number, position of channel in data block, 4 digit number

NA = channel name/*, the * requests 12 character name of item as the label

CH = channel number/*, the * requests 12 character name of item as the label

WD = word number/*, the * requests 12 character name of item as the label

NA = channel name/text, text requests up to 12 characters of supplied label

CH = channel number/text, text requests up to 12 characters of supplied label

WD = word number/text, text requests up to 12 characters of supplied label

LN = line, 1 to 48, with 1 and 2 reserved for the header

CL = column, 1 to 80 for display; 10 to 70 for bar graph; 1 to 20/40 for IDD

FM = format, Gm.n, Em.n, Fm.n, Im, or Am (standard Fortran formats)

SI = size specified as N = normal, 24 by 80; R = reduced, 48 by 80

CO = color specified as GR, OR, RD, BL, YL, CY, WH, and MG

IN = intensity specified as N = normal; R = reduced

TL = position for IDD text, 1 to 40

TX = text for an IDD set

MN = minimum value for Y axis (required)

MX = maximum value for Y axis (required)

DEFAULTS:

CL = 1

SI = N

CO = GR

IN = N

TL = 1

Items may be entered in any order if keywords are used. If entered positionally, i.e., without a keyword, the order in which items may be entered in both prompt mode and in editing the display files with a context editor is exactly as follows:

FUNCTION TE: (display text)

LINE,COLUMN

LN=1,CL=1 ...or 1,1

FUNCTION DA: (display sequence)

ITEM,LINE,COLUMN,FORMAT,SIZE,COLOR,INTENSITY

NA=TEST, LN=1, CL=1, FM=F10.4, SI=R, CO=GR, IN=R

or TEST,1,1,F10.4,R,GR,R

FUNCTION AT: (text attribute)

LINE,COLUMN,SIZE,COLOR,INTENSITY

LN=10,CL=5,SI=N,CO=OR,IN=N ...or 10,5,N,OR,N

FUNCTION BG: (bar graph)

ITEM,COLUMN,FORMAT,SIZE,COLOR,MINIMUM,MAXIMUM

NA=PRE\$1,CL=20,FM=G8.4,SI=R,CO=BL,MN=15.,MX=100.

or PRE\$1,20,G8.4,R,BL,15.,100.

FUNCTION LT: (limit data)

LN=30 ...or 30

NA=TEMP1,TEMP2 ...or TEMP1,TEMP2

NA=*ALL ...or *ALL

FUNCTION DD: (IDD set)

IDD NUMBER,ITEM,COLUMN,FORMAT,TEXT POSITION,TEXT

ID=5,NA/WD/CH=4002,CL=15,FM=F6.3,TL=1,TX='RAKE' ...or 5,4002,15,F6.3,1,'RAKE'

ADD

With the TE function, text can be added by overwriting the already existing line. When using the DA, AT or DD functions, the ADD operation adds the new sequence to the end of the sequence list. New sequences may be added each time the prompt character >> appears.

INSERT

When desiring to insert a sequence for the functions DA, AT, or DD, the prior sequence number is entered and then the new data is inserted. Additional sequences may be inserted each time the prompt character >> appears. The file is resequenced after each insert is made.

CHANGE WITH REVIEW

When making a change, the line of text or sequence is reviewed, the changes are made, and the new line is reviewed. For the TE function, the line is only reviewed beginning with the start column, CL.

CHANGE WITH NO REVIEW

For the TE function a line, column, and text for that line are required as an input request. For the DA, AT, and DD functions, the sequence number and data are entered on the same line.

DELETE

The line to be deleted is reviewed before it is deleted and the remainder of the lines are not resequenced until the delete operation is terminated. Deletes may be entered as one sequence or as a simple band of sequences.

MOVE

The line in the text is moved from LN1, CL1 to end of line, to new LN2, CL2. The moved portion of LN1 from CL1 to the end of line is deleted.

EXAMPLES:

Enter DISP editing:

\$ DISP

13-SEP-83 12:06:59
ENTER FUNCTION >>

Edit text items on a text page:

```

ENTER FUNCTION >> TE
ENTER DISPLAY PAGE NUMBER >> 99
ENTER EDIT OPERATION >> A
ENTER LN,CL >> 3,7
ENTER NEW TEXT
  >> THIS IS A TEST CASE.      THIS WILL BE ERASED SOON!
  >>
ENTER EDIT OPERATION >> C
ENTER LN,CL >> 7,42
  LN= 7,CL=42,
ENTER NEW TEXT
  >> THIS IS AN ADDITIONAL LINE.
THIS IS AN ADDITIONAL LINE.
ENTER LN,CL >>
ENTER EDIT OPERATION >> R
ENTER LN(S) >> 1-10

```

	1	2	3	4	5	6	7
CC	1234567890	1234567890	1234567890	1234567890	1234567890	1234567890	1234567890
LN=	1,CL= 1,						
LN=	2,CL= 1,						

```

LN= 3,CL= 1,      THIS IS A TEST CASE.      THIS WILL BE ERASED SOON!
LN= 4,CL= 1,
LN= 5,CL= 1,
LN= 6,CL= 1,
LN= 7,CL= 1,      THIS IS AN ADDITIONAL LINE.
LN= 8,CL= 1,
LN= 9,CL= 1,
LN=10,CL= 1,
ENTER LN(S) >>
ENTER EDIT OPERATION >> M
ENTER LN(S),CL TO MOVE FROM >> 7,1
  LN= 7,CL= 1,      THIS IS AN ADDITIONAL LINE.
ENTER LN(S),CL TO MOVE TO >> 5
ENTER LN(S),CL TO MOVE FROM >>
ENTER EDIT OPERATION >> R
ENTER LN(S) >> 1-10
      1          2          3          4          5          6          7
CC 123456789012345678901234567890123456789012345678901234567890
LN= 1,CL= 1,
LN= 2,CL= 1,
LN= 3,CL= 1,      THIS IS A TEST CASE.      THIS WILL BE ERASED SOON!
LN= 4,CL= 1,
LN= 5,CL= 1,      THIS IS AN ADDITIONAL LINE.
LN= 6,CL= 1,
LN= 7,CL= 1,
LN= 8,CL= 1,
LN= 9,CL= 1,
LN=10,CL= 1,
ENTER LN(S) >>
ENTER EDIT OPERATION >> B
ENTER LN(S),CL >> 3,32
  LN= 3,CL=32,THIS WILL BE ERASED SOON!
    1 LINE(S) BLANKED
ENTER LN(S),CL >>
ENTER EDIT OPERATION >> R
ENTER LN(S) >> 3
      1          2          3          4          5          6          7
CC 123456789012345678901234567890123456789012345678901234567890
  LN= 3,CL= 1,      THIS IS A TEST CASE.
ENTER LN(S) >>
ENTER EDIT OPERATION >> M
ENTER LN(S),CL TO MOVE FROM >> 5,42
  LN= 5,CL=42,THIS IS AN ADDITIONAL LINE.
ENTER LN(S),CL TO MOVE TO >> 5,10
ENTER LN(S),CL TO MOVE FROM >>
ENTER EDIT OPERATION >> R
ENTER LN(S) >> 5
      1          2          3          4          5          6          7
CC 123456789012345678901234567890123456789012345678901234567890
  LN= 5,CL= 1,      THIS IS AN ADDITIONAL LINE.
ENTER LN(S) >>
ENTER EDIT OPERATION >>
ENTER FUNCTION >>

```

Edit data items on a display page:

```

ENTER FUNCTION >> DA
ENTER DISPLAY PAGE NUMBER >> 1
ENTER EDIT OPERATION > >A
  ADDING SEQUENCE 5
  ENTER DATA FOR NEW SEQUENCE(S)
  >> CH=4007/PRESS
  >> 4049,10,,F10.4
  >> WD=15/*,10,10,F10.4
  >>
    3 SEQUENCE(S) ADDED
  ENTER EDIT OPERATION >> R
  ENTER SEQUENCE(S) >> 1-3
    SQ= 1 4001-4010,CL=2,LN=5,FM=10.4
    SQ= 2 PT2,5,15,F10.4
    SQ= 3 PT3,15,15,G14.4
  ENTER SEQUENCE(S) >>
  ENTER EDIT OPERATION >> D
  ENTER SEQUENCE(S) >> 4
    SQ= 4 WD=67,17,24,A4
    1 SEQUENCE(S) DELETED
  ENTER SEQUENCE(S) >>
    DISPLAY PAGE RESEQUENCED BY DELETE(S)
  ENTER EDIT OPERATION >> I
  ENTER NEW SEQUENCE >> 2
  ENTER DATA FOR NEW SEQUENCE(S)
  >> PT3,10,15,F10.4,CO=GR
  >>
    1 SEQUENCE(S) INSERTED
    DISPLAY PAGE RESEQUENCED BY INSERT(S)
  ENTER EDIT OPERATION >> C
  ENTER SEQUENCE >> 2
    SQ= 2 PT2,5,15,F10.4
  ENTER CHANGES >> WD=61,5,2,F9.5
  WD=61,5,2,F9.5
  ENTER SEQUENCE >>
  ENTER EDIT OPERATION >> CN
  ENTER SEQUENCE AND CHANGES
  >> 1,CL=10
  >> 2,WD=224
  >>
  ENTER EDIT OPERATION >>
  FUNCTION COMPLETE
  ENTER FUNCTION >>

```

Edit attributes on an attribute page:

```

ENTER FUNCTION >> AT
ENTER DISPLAY PAGE NUMBER >> 99

```

```

ENTER EDIT OPERATION >> A
  ADDING SEQUENCE 4
  ENTER DATA FOR NEW SEQUENCE(S)
  >> 35,,,OR
  >> 7,13,CO=BL
  >>
    2 SEQUENCE(S) ADDED
ENTER EDIT OPERATION >> C
ENTER SEQUENCE >> 5
  SQ= 5 7,13,CO=BL
ENTER CHANGES >> CO=YL
7,13,CO=YL
ENTER SEQUENCE >>
ENTER EDIT OPERATION >> R
ENTER SEQUENCE(S) >> 1-3
  SQ = 7,,,OR
  SQ = 23,,,YL
  SQ = 31,,,CY
ENTER SEQUENCE(S) >>
ENTER EDIT OPERATION >>
  FUNCTION COMPLETE
ENTER FUNCTION >>

```

Edit limit data items on a limit data page:

```

ENTER FUNCTION >> LT
ENTER DISPLAY PAGE NUMBER >> 99
ENTER EDIT OPERATION >> A
  ENTER NEW NAMES(S)
  >> LN=30
  >> IRUN,CONF,SPEED,RUDDER,OBOARD,IBOARD,MO,PTO,PO,TO,TTO
  >>
ENTER EDIT OPERATION >> R
LN =30
NA =IRUN,CONF,SPEED,RUDDER,OBOARD,IBOARD,MO,PTO,PO,TO,TTO
ENTER EDIT OPERATION >> C
ENTER NAME >> LN
ENTER CHANGE >> 20
ENTER NAME >>
ENTER EDIT OPERATION >> R
LN =20
NA =IRUN,CONF,SPEED,RUDDER,OBOARD,IBOARD,MO,PTO,PO,TO,TTO
ENTER EDIT OPERATION >> D
ENTER NAME(S) >> RUDDER,MO,TTO
ENTER NAME(S) >>
ENTER EDIT OPERATION >> R
LN =20
NA =IRUN,CONF,SPEED,OBOARD,IBOARD,PTO,PO,TO
ENTER EDIT OPERATION >>
FUNCTION COMPLETE
ENTER FUNCTION >>

```

Edit data items of an IDD file:

```

ENTER FUNCTION >> DD
ENTER IDD SET NUMBER >> 1
ENTER EDIT OPERATION >> A
  ADDING SEQUENCE 10
  ENTER DATA FOR NEW SEQUENCE(S)
    >> ID=2,WD=10
    >> ID=2,CL=10,TL=1,TX='PRES'
    >>
  ENTER NEW OPERATION >> CN
  ENTER SEQUENCE and CHANGES
    >> 1,NA=PT4
    >> 2,ID=2
    >> 3,ID=1,TX='BAROM'
    >>
  ENTER EDIT OPERATION >>
  FUNCTION COMPLETE
ENTER FUNCTION >>

```

Copy display page:

```

ENTER FUNCTION >> CP
  ENTER PG, LA, OR DS >> PG
  ENTER DISPLAY PAGE NUMBER TO BE COPIED >> 25
  COPIED TO ? 31
  COPY COMPLETE
ENTER FUNCTION >>

```

Copy limits from a display page:

```

ENTER FUNCTION >> CP
  ENTER PG, LA, OR DS >> LA
  ENTER DISPLAY PAGE NUMBER TO BE COPIED >> 14
  COPIED TO ? 16
  COPY COMPLETE
ENTER FUNCTION >>

```

Erase display page:

```

ENTER FUNCTION >> ER
  ENTER PG OR DS >> PG
  ENTER DISPLAY PAGE NUMBER >> 99
  ERASE IN EXECUTION...DISP EXITED
$

```

Check display page:

```
ENTER FUNCTION >> CK
ENTER PG OR DS >> PG
ENTER DISPLAY PAGE NUMBER >> 3
```

```
CHECK COMPLETE
ENTER FUNCTION >>
EDITING COMPLETE
$
```

5. LIMIT CHECK EDITING

LIMIT

Edits limit blocks that are used to define limit checking for sampled and calculated channels

FORMAT:

LIMIT operation, block name

EDIT OPERATION COMMANDS:

- A = ADD a level to a new or existing limit block
- C = CHANGE WITH REVIEW a limit block
- R = REVIEW a limit block
- P = PRINT all limit blocks on the facility printer
- D = DELETE a level from an existing limit block
- ? = explain the required response
- / = end the limit checking editing session
- (CR) end the present phase of response

Limit blocks are identified by a limit block name. The parameters within the limit block are identified by keywords or by position. A limit block contains up to three levels of limit checking. Each level has its own window limit values and associated parameters.

KEYWORDS:

NA = block name (up to 6 characters, the first must be alphabetic)
(the keyword, NA, is not required)

LE = level number (1-3)

LL = lower limit value

= NONE remove lower value

UL = upper limit value

= NONE remove upper value

NV = number of consecutive failures to be called a violation (1-16)

CT = output contact closures on violation (up to 4 contacts)

= NONE remove contacts

valid contact numbers are:

81001-81256

82001-82256

83001-83256

84001-84256

AC = action taken on violation (up to 8 actions)

= RD do a data recording

= F1 to F3 freeze the history files (1-3)

= S1 to S4 special as yet undefined actions (1-4)

= NO remove actions

DEFAULTS:

LE = 1

LL = NONE

UL = NONE

NV = 1

CT = NONE

AC = NO

POSITIONAL ORDER:

Parameters may be entered in any order if keywords are used. If entered positionally, i.e., without a keyword, the order in which parameters can be entered is as follows:

LE=1,LL=2,UL=7,NV=3,CT=(82135,84207),AC=(RD,F1,F2,F3,S1,S2,S3,S4)

or 1,2,7,3,(82135,84207),(RD,F1,F2,F3,S1,S2,S3,S4)

EXAMPLES:

Enter limit blocks:

```
$ LIMIT
14-SEP-83 07:22:05
ENTER EDIT OPERATION >> A
ENTER BLOCK NAME >> LIM1
ENTER LEVEL NUMBER, PARAMETERS
>> 1,10,25
>>
ENTER BLOCK NAME >> LIM2
ENTER LEVEL NUMBER, PARAMETERS
>> 1,2,7
>>
ENTER BLOCK NAME >>
ENTER EDIT OPERATION >> R
ENTER BLOCK NAME >> LIM1

LIM1
LE=1,LL= 10.00000 ,UL= 25.00000 ,NV= 1,CT=NONE,AC=NO

ENTER BLOCK NAME >> LIM2

LIM2
LE=1,LL= 2.00000 ,UL= 7.00000 ,NV= 1,CT=NONE,AC=NO

ENTER BLOCK NAME >>
ENTER EDIT OPERATION >>
$
```

Enter limit block names in CHAN editor:

```
$ CHAN
14-SEP-83 07:26:16
ENTER EDIT OPERATION >> C
ENTER CHANNEL ID >> WD=17-20
17,NA=RUNNO,CH=4017,RA=50,EU=IDN,PC=NO,CD=N,RF=NONE,LM=NONE,LG=0
ENTER CHANGES >> LM=LIM1,LG=3
17,NA=RUNNO,CH=4017,RA=50,EU=IDN,PC=NO,CD=N,RF=NONE,LM=LIM1,LG=3
```

```

18,NA=BTCHNO,CH=4018,RA=50,EU=IDN,PC=NO,CD=N,RF=NONE,LH=NONE,LG=0
ENTER CHANGES >> LM=LIM1
18,NA=BTCHNO,CH=4018,RA=50,EU=IDN,PC=NO,CD=N,RF=NONE,LH=LIM1,LG=0
19,NA=AERPRP,CH=4019,RA=50,EU=C19,PC=NO,CD=N,RF=NONE,LH=NONE,LG=0
ENTER CHANGES >> LM=LIM2,LG=3
19,NA=AERPRP,CH=4019,RA=50,EU=C19,PC=NO,CD=N,RF=NONE,LH=LIM2,LG=3
20,NA=NACELL,CH=4020,RA=50,EU=C20,PC=NO,CD=N,RF=NONE,LH=NONE,LG=0
ENTER CHANGES >> LM=LIM2
20,NA=NACELL,CH=4020,RA=50,EU=C20,PC=NO,CD=N,RF=NONE,LH=LIM2,LG=0
ENTER CHANNEL ID >>
ENTER EDIT OPERATION >>
$

```

Enter limit block CHANNEL IDD's in DISP editor:

```

$ DISP

14-SEP-83 07:33:42
ENTER FUNCTION >> LT
ENTER DISPLAY PAGE OR ID SET NUMBER >> 100
ENTER EDIT OPERATION >> A
  ENTER NEW NAME(S)
  >> LN=20
  >> *ALL
  >>
ENTER EDIT OPERATION >> C
ENTER NAME >> LN
ENTER CHANGE >> 30
ENTER NAME >>
ENTER EDIT OPERATION >> R
LN =30
NA =*ALL
ENTER EDIT OPERATION >>
ENTER FUNCTION >>
  EDITING COMPLETE
$

```

Disarm channels:

```

$ LIMOFF WD=18,NACELL,LG=3

```

Remove limit block CHANNEL IDD's in DISP editor:

```

$ DISP

14-SEP-83 07:38:31
ENTER FUNCTION >>LM
ENTER DISPLAY PAGE OR ID SET NUMBER >>100
ENTER EDIT OPERATION >>D
ENTER NAME(S) >>*ALL

```

```

ENTER NAME(S) >>
ENTER EDIT OPERATION >>
FUNCTION COMPLETE
ENTER FUNCTION >>
EDITING COMPLETE
$

```

Remove limit block names in CHAN editor:

```

$ CHAN
14-SEP-83 07:39:39
ENTER EDIT OPERATION >> C
ENTER CHANNEL ID >> WD=17-20
17,NA=RUNNO,CH=4017,RA=50,EU=IDN,PC=NO,CD=N,RF=NONE,LM=LIM1,LG=3
ENTER CHANGES >> LM=NONE,LG=0
17,NA=RUNNO,CH=4017,RA=50,EU=IDN,PC=NO,CD=N,RF=NONE,LM=NONE,LG=0
18,NA=BTCHNO,CH=4018,RA=50,EU=IDN,PC=NO,CD=N,RF=NONE,LM=LIM1,LG=0
ENTER CHANGES >> LM=NONE
18,NA=BTCHNO,CH=4018,RA=50,EU=IDN,PC=NO,CD=N,RF=NONE,LM=NONE,LG=0
19,NA=AEPFRP,CH=4019,RA=50,EU=C19,PC=NO,CD=N,RF=NONE,LM=LIM2,LG=3
ENTER CHANGES >> LM=NONE,LG=0
19,NA=AEPFRP,CH=4019,RA=50,EU=C19,PC=NO,CD=N,RF=NONE,LM=NONE,LG=0
20,NA=NACELL,CH=4020,RA=50,EU=C20,PC=NO,CD=N,RF=NONE,LM=LIM2,LG=0
ENTER CHANGES >> LM=NONE
20,NA=NACELL,CH=4020,RA=50,EU=C20,PC=NO,CD=N,RF=NONE,LM=NONE,LG=0
ENTER CHANNEL ID >>
ENTER EDIT OPERATION >>
$

```

Remove limit blocks:

```

$ LIMIT
14-SEP-83 07:41:14
ENTER EDIT OPERATION >> D
ENTER BLOCK NAME >> LIM1
ENTER LEVEL NUMBER >> 1
ENTER LEVEL NUMBER >>

ENTIRE BLOCK LIM1 DELETED
ENTER BLOCK NAME >> LIM2
ENTER LEVEL NUMBER >> 1
ENTER LEVEL NUMBER >>

ENTIRE BLOCK LIM2 DELETED
ENTER BLOCK NAME >>
ENTER EDIT OPERATION >>
$

```

6. PARAMETER INPUT

E3PAR

Reviews and changes parameters that were previously named in the system parameter definition file E3PAR.EDT

FORMAT:

E3PAR operation, parameter name

OPERATION COMMANDS:

C = CHANGE parameter

R = REVIEW parameter, current value, and comments

P = PRINT all parameters, values, and comments on facility printer

CHANGE

The parameter name, its current value, and any comments will be typed before the change is entered. The parameter name will be typed again, requesting the new value from the user. The new value entered may be an integer, a decimal number, or a 1 to 4 alphanumeric character. The name of the parameter to be changed may be from 1 to 8 characters.

REVIEW

When reviewing a single parameter, only the named parameter will be reviewed. If the parameter is ALL, a complete list of all of the parameters, along with their current values and descriptions of their functions, will be given. The name of the parameter to be reviewed may be from 1 to 8 characters.

PARAMETER NAMES:

SI	= '1.00'	!! DEFAULT SCAN INTERVAL
MTEXT	= ON	!! CONTROL E3 MESSAGE TEXT
CTERM	= ON	!! CONTROL E3 MESSAGES TO CENTRAL TERMINAL
LMCH	= ON	!! LIMIT CHECKING OFF/ON WHEN SCAN IS INVOKED
LIMPR	= ON	!! LIMIT VIOLATIONS TO ALARM PRINTER
CYREC	= DR	!! CYCLIC RECORDING TO DATA(DR) OR TEST(TR) READINGS
NCYCL	= 6	!! NUMBER OF CYCLES IN CYCLIC RECORDING
SCAL	= 3600	!! NUMBER OF SCANS PER NEFF MUX CHANNEL CALIBRATION
DOEDIT	= ON	!! IMMEDIATE RESPONSE TO EDIT CHANGES
IDDSZ	= 40	!! NUMBER OF CHARACTERS AVAILABLE ON IDDS
CRTSZ	= N	!! DEFAULT CHAR. SIZE FOR ALL CRTS (24 BY 48)

```

CRICOL = GR      !! DEFAULT COLOR(GREEN/BLACK) FOR ALL CRTS (TEXT AND DATA)
BACKG  = N      !! BACKGROUND : NORMAL FOR ALL CRTS (TEXT AND DATA)
INTENS = N      !! INTENSITY : NORMAL FOR ALL CRTS(TEXT AND DATA)
STDUMP = MV     !! STDUMP STARTS WITH 'RAW' DATA, 'MV', OR 'EU'
AUTOSD = OFF    !! AUTOMATIC STDUMP AT DATA RECORD TIME
AUTORD = OFF    !! AUTOMATIC RDUMP AT DATA RECORD TIME
PREDST =        2 !! LOCATION, IN COMMON IUPAR (PARAM FILE), OF START OF PREDATA
PREDCT =      100 !! NUMBER OF PREDATA WORDS
NRFRZ1 =       10 !! NUMBER OF RECORDS FOLLOWING HF1 FREEZE
HFWF1  =        1 !! HISTORY FILE 1 WRITE FREQUENCY, EVERY (HFWF1) SCANS
NRFRZ2 =       10 !! NUMBER OF RECORDS FOLLOWING HF2 FREEZE
HFWF2  =        0 !! HISTORY FILE 2 WRITE FREQUENCY, EVERY (HFWF2) SCANS
NRFRZ3 =       10 !! NUMBER OF RECORDS FOLLOWING HF3 FREEZE
HFWF3  =        1 !! HISTORY FILE 3 WRITE FREQUENCY, EVERY (HFWF3) SCANS
ESPCHN =      192 !! NUMBER OF ESP CHANNELS
ESPSI  =  1.00000 !! ESP SCAN INTERVAL (SECS.)
AN1    =        2 !! INITIAL DISPLAY PAGE # FOR CRT 1
AN2    =       20 !! INITIAL DISPLAY PAGE # FOR CRT 2
AN3    =       21 !! INITIAL DISPLAY PAGE # FOR CRT 3
AN4    =        3 !! INITIAL DISPLAY PAGE # FOR CRT 4
AN5    =       19 !! INITIAL DISPLAY PAGE # FOR CRT 5
AN6    =        0 !! INITIAL DISPLAY PAGE # FOR CRT 6
AN7    =        0 !! INITIAL DISPLAY PAGE # FOR CRT 7
AN8    =        0 !! INITIAL DISPLAY PAGE # FOR CRT 8
AN9    =        1 !! IDD ACTIVE FLAG (0-OFF, 1-ON)
AN1R   =        1 !! UPDATE CRT 1 EVERY (AN1R) SCAN CYCLES
AN2R   =        1 !! UPDATE CRT 2 EVERY (AN2R) SCAN CYCLES
AN3R   =        1 !! UPDATE CRT 3 EVERY (AN3R) SCAN CYCLES
AN4R   =        1 !! UPDATE CRT 4 EVERY (AN4R) SCAN CYCLES
AN5R   =        1 !! UPDATE CRT 5 EVERY (AN5R) SCAN CYCLES
AN6R   =        1 !! UPDATE CRT 6 EVERY (AN6R) SCAN CYCLES
AN7R   =        1 !! UPDATE CRT 7 EVERY (AN7R) SCAN CYCLES
AN8R   =        1 !! UPDATE CRT 8 EVERY (AN8R) SCAN CYCLES
AN9R   =        1 !! UPDATE IDD EVERY (AN9R) SCAN CYCLES
A1FP   =        1 !! FUNCTION PANEL NUMBER FOR ASCII CRT 1
A2FP   =        2 !! FUNCTION PANEL NUMBER FOR ASCII CRT 2
A3FP   =        3 !! FUNCTION PANEL NUMBER FOR ASCII CRT 3
A4FP   =        4 !! FUNCTION PANEL NUMBER FOR ASCII CRT 4
A5FP   =        5 !! FUNCTION PANEL NUMBER FOR ASCII CRT 5
A6FP   =        6 !! FUNCTION PANEL NUMBER FOR ASCII CRT 6
A7FP   =        7 !! FUNCTION PANEL NUMBER FOR ASCII CRT 7
A8FP   =        8 !! FUNCTION PANEL NUMBER FOR ASCII CRT 8
REPORT = FULL    !! PRE-RUN CALIB: 'EXCP' FOR EXCEPTION REPORT; ELSE 'FULL'
PNSAMP =       15 !! NUMBER OF SAMPLES FOR PRE-RUN CALIB AND STAT AVERAGES
PZEROA = 0.500000 !! PRE-RUN CALIB 'ZERO' LIMIT IN % OF FULL SCALE
PSPAN  = 0.600000 !! PRE-RUN CALIB 'SPAN' LIMIT IN % OF FULL SCALE
PSTDA  = 2.10000  !! PRE-RUN CALIB UMIN/UMAX LIMIT IN UNITS OF SIGMA
PSTDW  = 2.00000  !! PRE-RUN STAT UMIN/UMAX LIMIT IN UNITS OF SIGMA
MCAVG  =       20 !! NUMBER OF SCANS IN AVERAGE FOR NEFF MUX CHAN CALIBRATION
MCZERO = 0.500000 !! NEFF MUX CALIBRATION CHAN ZERO LIMIT IN % OF FULL SCALE
MCSPAN = 0.500000 !! NEFF MUX CALIBRATION CHAN SPAN LIMIT IN % OF FULL SCALE
NEFFCR = ON      !! 'ON' TO USE NEFF CALIBRATION CORRECTIONS; OTHERWISE 'OFF'

```

EXAMPLES:

\$ E3PAR

22-NOV-83 13:56:54

ENTER OPERATION>>R

ENTER PARAM NAMES>>AN1,AN2,AN3,AN4

AN1	=	2	!! INITIAL DISPLAY PAGE # FOR CRT 1
AN2	=	20	!! INITIAL DISPLAY PAGE # FOR CRT 2
AN3	=	21	!! INITIAL DISPLAY PAGE # FOR CRT 3
AN4	=	3	!! INITIAL DISPLAY PAGE # FOR CRT 4

ENTER PARAM NAMES>>

ENTER OPERATION>>C

ENTER PARAM NAMES>>AN1,AN2,AN3,AN4

AN1	=	2	:	AN1	=	>>5
AN1	=	5				
AN2	=	20	:	AN2	=	>>18
AN2	=	18				
AN3	=	21	:	AN3	=	>>14
AN3	=	14				
AN4	=	3	:	AN4	=	>>10
AN4	=	10				

ENTER PARAM NAMES>>

ENTER OPERATION>>

READ E3PAR.EDT INTO GLOBAL COMMON

EDIT COMPLETE : E3PAR.EDT REWRITTEN

\$

PARAM

Reviews and changes parameters that were previously named in the application parameter definition file PARAM.EDT (specified by the engineer and built by the programmer)

FORMAT:

PARAM operation,parameter name

All functions and prompting procedures are the same for the PARAM command as for the E3PAR command.

7. HISTORY FILE

PLAYBACK

Runs the playback of history file data (can't be used in SCAN)

FORMAT:

PLAYBACK

DESCRIPTION:

The playback task is used to analyze the data from a previous run that was recorded in the event analysis history file. Most features of a live run are available to the user, such as display changing or data recording. However, no data acquisition takes place and no new history file data is recorded.

SAMPLE:

\$ PLAYBACK

TYPE HISTORY FILE TO BE PLAYED BACK (1,2, OR 3)

2

HF2 RECORD LENGTH = 504 NO. OF RECORDS = 3900

FILE POSITION: REC. NO.= 372 9/21/83 20:29:22:933

TYPE IN NEW POSITION: +OR- NO. OF SCANS, OR DEFAULT TO ACCEPT
2500

FILE POSITION: REC. NO.= 2872 9/21/83 21:11: 2:933

TYPE IN NEW POSITION: +OR- NO. OF SCANS, OR DEFAULT TO ACCEPT
1000

FILE POSITION: REC. NO.= 3872 9/21/83 21:27:42:933

TYPE IN NEW POSITION: +OR- NO. OF SCANS, OR DEFAULT TO ACCEPT

TYPE PLAYBACK SCAN INTERVAL (1 TO 500 SECS.)

DEFAULT TO HOLD UNTIL STEP BUTTON IS PUSHED

BLDHF

Creates a failure analysis history file HF1.DAT, HF2.DAT, or HF3.DAT

FORMAT:

BLDHF

EXAMPLES:

\$ BLDHF

TYPE HISTORY FILE TO BE OPENED (1, 2, OR 3)

1

TYPE SCAN LENGTH (INCLUDE CALCULATIONS IF DESIRED)

600

TYPE NUMBER OF SCANS IN FILE

600

1

604

600

OPEN ANY OTHER FILES ? (Y/N)

N

\$

III. FACILITY STAND-ALONE SUPPORT

The facility stand-alone support uses the facility located PDP-11/34A as a stand-alone computer. Facility stand-alone support is used to run Instrument Test (TEST) and Statistical Analysis (FSTAT) programs. These programs can be run at the same time that the facility computer is supporting the full system operation. Also, TEST and FSTAT for general purpose digitizer channels can be run concurrent with TEST and FSTAT for the pressure data subsystem. The exact number of concurrent independent functions that can be run on the facility computer can not be determined until some experience has been gained.

A. GETTING STARTED

Boot the facility computer (as described in Sec. II.A.1.)

The facility computer will come up ready to support stand-alone functions, as well as full system services. After running a startup procedure, the system will respond with the operating system prompt >. At this point, any of the stand-alone commands can be executed.

B. STAND-ALONE COMMANDS

E3X

Function to bring up the full run-time facility tasks with communication with the central VAX. [see Sec. II.A.1.a.8)]

FORMAT:

E3X

CHECK

An initial checkout system used to determine if all of the associated hardware is functioning properly.

FORMAT:

@CHECK (see Sec. II.A.4.)

FSTAT

Task to determine noise characteristics. A list is built with channel numbers and device types used in acquiring data. Statistical calculations are made on this data.

FORMAT:

@FSTAT

SAMPLE:

```
>@FSTAT
> ;
> ; 30-SEP-83 13:42:46 FSTAT PROGRAM
>
  ENTER OUTPUT MODE,ALL=FULL,PA=OUT OF LIMITS ONLY
  ALL
  ENTER NUMBER OF SAMPLES,DEFAULT= 100
  50
  ENTER STD. DEV. LIMIT,DEFAULT= 0.2000

  ENTER CHANNEL NUMBER OR NUMBERS
  N1,N2,N3, OR N1,LEN,DEFAULT TO QUIT
  4001,4005,4070
  ENTER CHANNEL NUMBER OR NUMBERS
  N1,N2,N3, OR N1,LEN,DEFAULT TO QUIT

  FSTAT  --  STOP

>
>@ <EOF>
>
```

When entering the number of channels, N1, LEN, one channel number is entered, followed by a number from 1 to 99, indicating the additional number of consecutive channels requested.

SAMPLE OUTPUT:

```
NEFF INPUT SYSTEM STATISTICAL NOISE CHECK
27-JUL-83 15:14:27
  NUMBER OF SAMPLES = 100      ALLOWABLE STANDARD DEV: 0.200
```

CHAN NO	FULL SCALE	MEAN (MVOLTS)	MIN (MVOLTS)	MAX (MVOLTS)	STANDARD DEVIATION	UMIN	UMAX
3	50MVS	6.418	6.412	6.424	0.002	-2.879	2.631
4	50MVS	6.422	6.418	6.427	0.002	-1.764	2.609
5	50MVS	6.415	6.409	6.421	0.003	-2.482	2.268

ANALOG GAIN CODES:NEFF SERIES 100
CLASS 1 (TYPES 1-4)

CODE	RANGE
	(MV)
2	200
3	100
4	50
5	20
6	10
7	5
10)10	1,000
11)10	500

NEFF SERIES 400
CLASS 2 (TYPES 5-8)

CODE	RANGE
	(MV)
0	10,240
1	5,120
2	2,560
3	1,280
4	640
5	320
6	160
7	80
8	40
9	20
10)10	10
11)10	5

USER CONSIDERATIONS:

FSTAT will handle only 1 type per scan.
Channel 0 for the ESP's is an invalid entry.

ERROR MESSAGE INTERPRETATION:

1. (FSTAT) DATE TIME : INVALID-REENTER

Response to output mode must be either ALL or PA
Response to number of samples is not numeric
Response to Standard Deviation Limit is invalid
Channel number entered is not numeric

2. (FSTAT) DATE TIME : INVALID-TYPE NOT SPECIFIED

The response to ENTER CHANNEL NUMBERS must begin with a value greater than 999 to designate the device type as well as the channels

3. (FSTAT) DATE TIME : INVALID CHANNEL TYPE

The first type entered establishes the only type acceptable for the 100 channels selected

4. (FSTAT) DATE TIME : CHANNEL TYPE NOT AVAILABLE

The random access file containing the gain codes does not contain the type entered

5. (FSTAT) DATE TIME : NUMBER OF CHANNELS EXCEEDS 100

All previous channels entered are disregarded, start again

6. (FSTAT) DATE TIME : NO ENTRY MADE

After FSTAT was run, no channels were entered before the default

7. (FSTAT) DATE TIME : ERROR-RETRY

A data request has been sent and the data has not been returned; three attempts will be made

8. (FSTAT) DATE TIME : NEFF ERROR, NAK = XXXX

Error remained in return of ESP data after three attempts

9. (FSTAT) DATE TIME : UNRECOVERABLE ESP ERROR

In failing to return the ESP data, any of the following may have occurred:

- A. attached error
- B. I/O time out
- C. Bad IEEE FCN code
- D. Delay in Calibration
- E. Data busy, response delayed

10. (FSTAT) DATE TIME : LIST NOT REC. NAK = XXXX

Fstat list sent, but has not been acknowledged as received by DATAQ

11. (FSTAT) DATE TIME : LIST NOT CANC. NAK = XXXX

The Fstat list was not successfully cancelled

E3S

Brings the full run-time system down

(see Sec. II.A.1.c.2))

FORMAT:

E3S

TEST

TEST is restricted to acquiring data from 88 or less consecutive/non-consecutive channels.

To start the TEST program, push the TEST button. The following prompt will then be displayed:

ENTER A FIVE DIGIT DEVICE-CHANNEL NUMBER
THE TWO HI-ORDER DIGITS ARE THE TYPE NUMBER
THE THREE LO-ORDER DIGITS ARE THE CHANNEL NUMBER

When the user correctly enters the five digit number and pushes the ENTER button, the program will respond with the following message:

THANK YOU!
YOU MAY NOW ENTER ANOTHER FIVE DIGIT DEV-CH NUMBER
THE DEVICE NUMBER MUST BE THE SAME
YOU MAY ALSO ENTER A RANGE NUMBER, OR
YOU MAY END INPUT BY PUSHING THE DISPLAY BUTTON

The range number can be 1-87. It represents the number of consecutive channels immediately following the five digit device-channel number. If the user attempts to enter two consecutive ranges or a range of zero, the program will respond with an error message. This procedure can be repeated until a maximum of 88 channels have been entered. Each time the user enters a range number, the following message will appear:

YOU MAY NOW ENTER ANOTHER FIVE DIGIT DEV-CH NUMBER
THE DEVICE NUMBER MUST BE THE SAME
YOU MAY END INPUT BY PUSHING THE DISPLAY BUTTON

The user can view the channels which he has selected by pushing the DISPLAY button. The display defaults to millivolts, but counts can be viewed by pushing the RAW button. Pushing the MV button, returns the display to millivolts. At this time, the EU (engineering units) button defaults to millivolts, except for ESP data, which is always displayed in engineering units.

A permanent record of displayed data can be made by pushing the PRINT button. Allow a minimum of 20 seconds between successive uses of this pushbutton.

To view a single channel, enter the five-digit device-channel number and push the DISPLAY button. The user can then view successive channels by depressing the DISPLAY button. A range of channels, immediately following the current displayed channel or the last channel in a group of channels, can be viewed by entering the range number and pushing the DISPLAY button.

The user can stop TEST by depressing the TEST button. An END OF TEST message will be displayed on the CRT screen.

Two classes of error messages are output by TEST. The first class is not fatal and serves to guide the user toward the correct use of TEST. The second class is fatal and detects execution problems in the data acquisition process associated with the digitizer. Fatal error messages cause TEST to stop. The program can be restarted by depressing the TEST button.

DISPLAY MESSAGES:

(TEST) DATE TIME : ONLINE

Displayed on the facility terminal (TT0) when a test has been made active

(TEST) DATE TIME : OFFLINE

Displayed on TT0 when a test has been terminated

NON-FATAL ERROR MESSAGES:

ERROR: YOU DID NOT ENTER A FIVE DIGIT DEVICE-CHANNEL NUMBER
THE NUMBER ENTERED WAS XXXX

INVALID TYPE NO. XX
THE NUMBER ENTERED WAS XXXX
TRY AGAIN
ENTER A FIVE DIGIT DEVICE-CHANNEL NUMBER

INVALID CHANNEL NUMBER XXX
THE NUMBER ENTERED WAS XXXX
TRY AGAIN

CHANNEL XXX CONTAINS AN INVALID GAIN
THE NUMBER ENTERED WAS XXXX
TRY AGAIN

YOU ARE MIXING DEVICE NUMBERS
THE DEVICE NUMBER SHOULD BE XX
THE NUMBER ENTERED WAS XXXX
YOU MAY END INPUT BY PUSHING THE DISPLAY BUTTON

ERROR: YOU MAY NOT ENTER TWO CONSECUTIVE RANGES
THE NUMBER ENTERED WAS XXX
ENTER A FIVE DIGIT DEVICE-CHANNEL NUMBER
YOU MAY END INPUT BY PUSHING THE DISPLAY BUTTON

MAXIMUM NUMBER OF CHANNELS ALREADY ENTERED
YOU MAY END INPUT BY PUSHING THE DISPLAY BUTTON

INVALID RANGE OF 0
TRY AGAIN

CHANNEL XX CONTAINS AN INVALID GAIN

Enter another channel number, the gain is not available
(for single channel display mode only)

FATAL ERROR MESSAGES:

TEST : TIMEOUT SEND ERROR - END OF TEST

List not received; this message with the attached date and time is printed on TT0

TEST : TIMEOUT RECEIVE ERROR - END OF TEST

Data not returned; date and time attached to error is printed on TT0

TEST : UNRECOVERABLE NEFF ERROR - END OF TEST

Error occurred in return of data; also printed on TT0 with date and time attached

TGAIN

TGAIN is a stand-alone facility computer task which will translate an alphanumeric data file into a table of gain codes used to control the gain settings on the Neff analog inputs. The gain list is down loaded from the VAX to the facility computer with any data acquisition requested by the VAX. These gain codes are saved in the disk of the facility computer and used for subsequent facility computer tasks, such as FSTAT and TEST. If TEST and FSTAT need to reference channels which are not used in the VAX, the gain settings must be entered via the facility computer. This is done by entering an input file into the facility computer via the RSX-11M editor (EDI) and then translating that input file with the TGAIN task.

DATA TYPES

The Escort III system has two classes of analog inputs. Class 1 is an amplifier per channel digitizer and class 2 inputs are multiplexed before passing through the amplifier. Escort III digitizers can be at any of four locations. The two high order digits of the five digit Escort III channel numbers indicate the data types and are defined as follows:

ANALOG		
TYPE	CLASS	LOCATION
1	1	A
2	1	B
3	1	C
4	1	D
5	2	A
6	2	B
7	2	C
8	2	D

INPUT FILE FORMAT:

An input file, GAINDATA.SET, must be created in UIC 20,1 using the RSX-11M editor. The channel numbers and full scale millivolt ranges can be entered in any combination of the following:

CH = n, RA = m for single entries

CH = n1-n2, RA = m for several consecutive channels at same gain range

The device number is indicated by the thousands portion of the channel value, while the three far right digits indicate the channel portion. As an example, CH = 3100, RA = 50 indicates channel number 100 of data type 3 with a gain range of 50 millivolts. Consecutive channels of the same type and gain can be indicated by submitting an input list, e.g., CH = 3100-3350, RA = 50.

REQUIREMENTS:

The channel information must be before the range information on a line

The right three digits of a channel number cannot exceed 512

Commas are used as delimiters between channel and range parameters

All lines must be left adjusted with no blank lines and no embedded blanks

All values must be integer values only

The program can handle a maximum of only two devices

GAIN RANGES:NEFF SERIES 100,200
CLASS 1

(MV)
200
100
50
20
10
5
1,000*
500*

NEFF SERIES 400
CLASS 2

(MV)
10,240
5,120
2,560
1,280
640
320
160
80
40
20
10
5

* requires hardware modification

PROGRAM EXECUTION:

>@{20,1}TGAIN ...or @TGAIN if UIC = 20,1
GCODES.TAB CREATED

TGAIN -- STOP

The TGAIN task will have translated the information in GAINDATA.SET input file into the GCODES.TAB file and into the form used by the FSTAT and TEST tasks. If errors or problems are encountered, error messages will be written and GCODES.TAB file will not be updated.

WARNING:

Successful completion of the TGAIN task will result in all gain codes in GCODES.TAB being updated. A negative one will be assigned to all channels not mentioned in the input list. If a combination of TGAIN gains and VAX gains is desired, TGAIN must be run first and then the VAX is run with data requests.

TGAIN ERROR MESSAGE INTERPRETATION:

1. [TGAIN] DATE TIME : SYNTAX ERROR IN PARAMETER 1 OF LINE XXX

Recheck the format of the line in question

2. [TGAIN] DATE TIME : SYNTAX ERROR IN CHANNEL KEYWORD OF LINE XXX

First entry should be CH in the line referred to

3. [TGAIN] DATE TIME : CHANNEL VALUE TOO LARGE IN LINE XXX
Channel number is larger than 513
4. [TGAIN] DATE TIME : 3 OR MORE DEVICES NOT ALLOWED. LINE XXX
Only 1 or 2 devices are allowed
5. [TGAIN] DATE TIME : ILLEGAL CHANNEL VALUE IN LINE XXX
Channel value is not numeric or the high channel value is less than the low value
6. [TGAIN] DATE TIME : DEVICE NUMBERS OF BANDED CHANNELS NOT EQUAL
Device numbers of the banded channels must be the same
7. [TGAIN] DATE TIME : SYNTAX ERROR IN PARAMETER 2 OF LINE XXX
Range parameter is invalid
8. [TGAIN] DATE TIME : SYNTAX ERROR IN RANGE KEYWORD OF LINE XXX
Keyword must be 'RA' in range description
9. [TGAIN] DATE TIME : ILLEGAL RANGE VALUE IN LINE XXX
Range value is not correct for device type
10. [TGAIN] DATE TIME : COULD NOT OPEN INPUT FILE
GAINDATA.SET could not be opened
11. [TGAIN] DATE TIME : GCODES.TAB NOT CREATED THIS RUN
An error in the input file and therefore GCODES.TAB was not created
12. [TGAIN] DATE TIME : COULD NOT OPEN OUTPUT FILE
GCODES.TAB could not be opened to write updated gain codes
13. [TGAIN] DATE TIME : COULD NOT CLOSE OUTPUT FILE
GCODES.TAB could not be closed
14. [TGAIN] DATE TIME : COULD NOT CLOSE INPUT FILE
GAINDATA.SET could not be closed

B.O.B.

Function is used to display channel values in millivolts or raw counts on a portable individual digital display (IDD) for types 1 through 8.

DESCRIPTION:

The Break Out Box (B.O.B.) task is started when Escort III is brought up. An OFF LINE message will be displayed.

BUTTONS AVAILABLE:

START/STOP Starts a session and displays the message ON LINE; to end a session, the button is pushed a second time

ENTER A type and channel number of the form:

TYPE CHANNEL
1 0 0 8

may be entered on the number entry panel (NEP); will return the value in the specified units

NEXT Will increment the existing channel by one if it is less than 511 and return a value

PREV If the channel number entered is greater than zero, will decrement the channel by one and return the value

RAW Causes all subsequent values to be returned as raw counts

MV Returns from raw counts back to millivolts, the default unit

CMV Values are returned in corrected millivolts

EU Values are returned in engineering units

CURRENT BUTTON ASSIGNMENTS:

NEXT	EU	MV	RAW
PREV	CMV	ENTER	START STOP

USER CONSIDERATIONS:

1. The break out box will handle only Neff analog types
2. GCODES.TAB, the list of gain codes, may contain as many as 512 (0-511) channels per type; if a channel for a given type has no gain, an error message will occur
3. A one second update of a channel will occur if no other button is pushed after returning a value
4. The VAX Escort III programs must be running in order to obtain engineering units and corrected millivolts

MESSAGES:

OFF LINE	no session is in progress
ON LINE	a session has been requested by the start/stop button being pushed
TIME OUT ERROR	error in reading the number entry panel
ERROR IN TYPE	the type requested does not match any type in GCODES.TAB
ERROR NEFF	unrecoverable Neff error
ESCORT3 DOWN	E3 is down and B.O.B. will stop
MAX CHAN IS 511	channel number requested exceeds 511
NO GAIN AVAIL.	the gain for given channel is not in GCODES.TAB
BAD CHAN NUMBER	channel not available in VAX list
NO MVC AVAIL	VAX is not in corrected millivolt mode
VAX NOT CONNECT	VAX is not connected
EU TIME OUT	return of EU data from VAX is delayed
CORR MV TIME OUT	return of MVC data from VAX is delayed

GLOSSARY

array.....more than a single element

BIU.....Buffered Interface Unit

codeout.....has an H tag; coded out or bad instrument

CSMA/CD.....Carrier Sense Multiple Access/Collision Detection, the
communication technique used to multiplex users onto a single
channel

DDCMP.....DEC's communication protocol

DMR11.....DEC's communication interface

ECC/MOS.....Electronic Chip Construction method for fast integrated circuits
(IC)

ESP.....Electro Scan Pressure

FDM.....Frequency Division Multiplexing

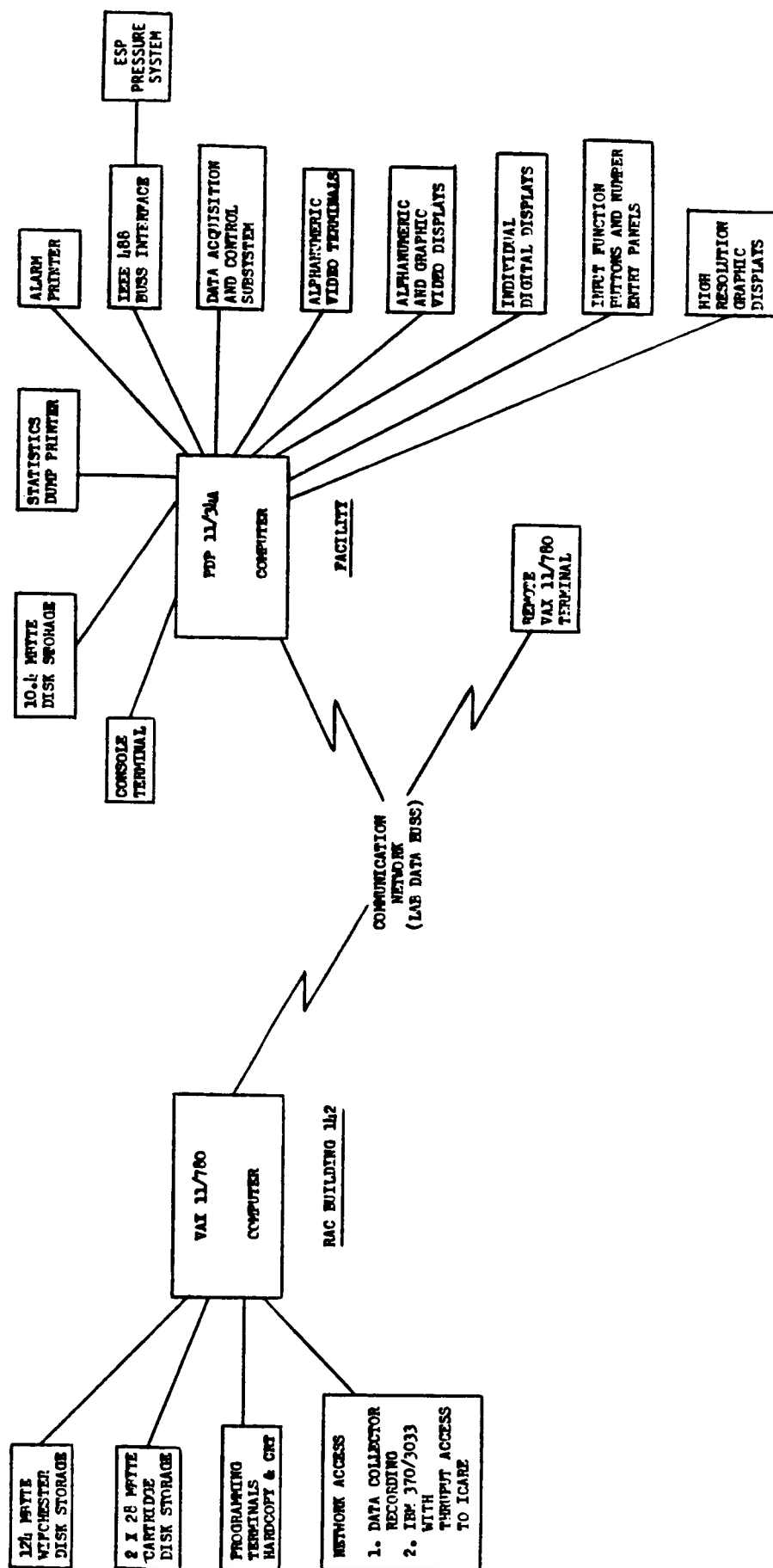
RS170.....video standard

TTL.....Transistor to Transistor Logic

UIC.....User Identification Code

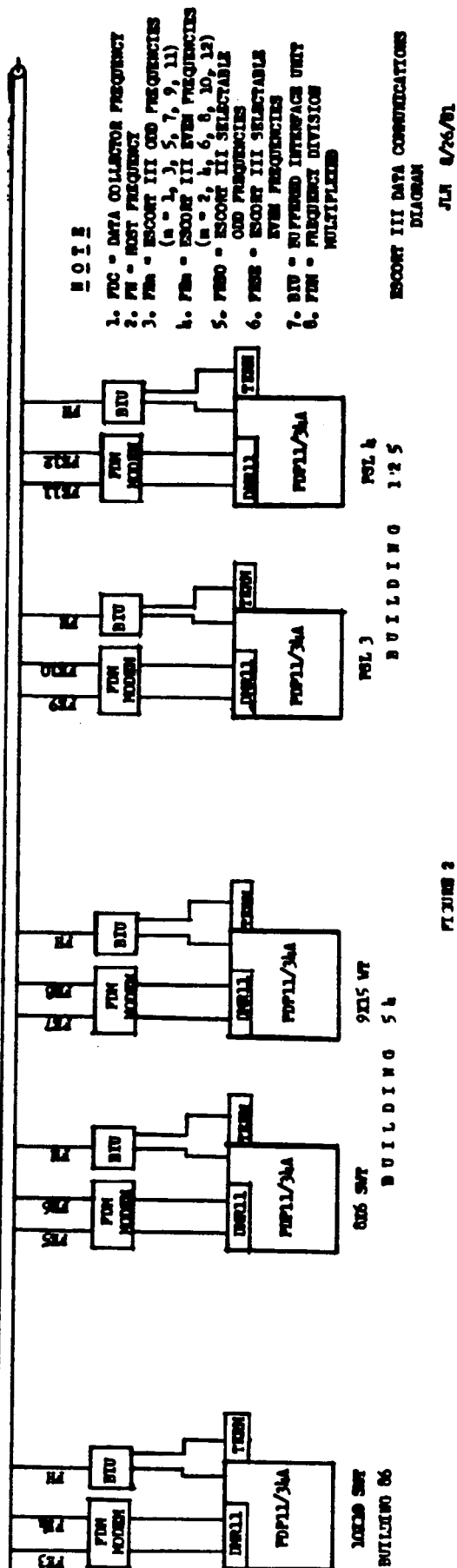
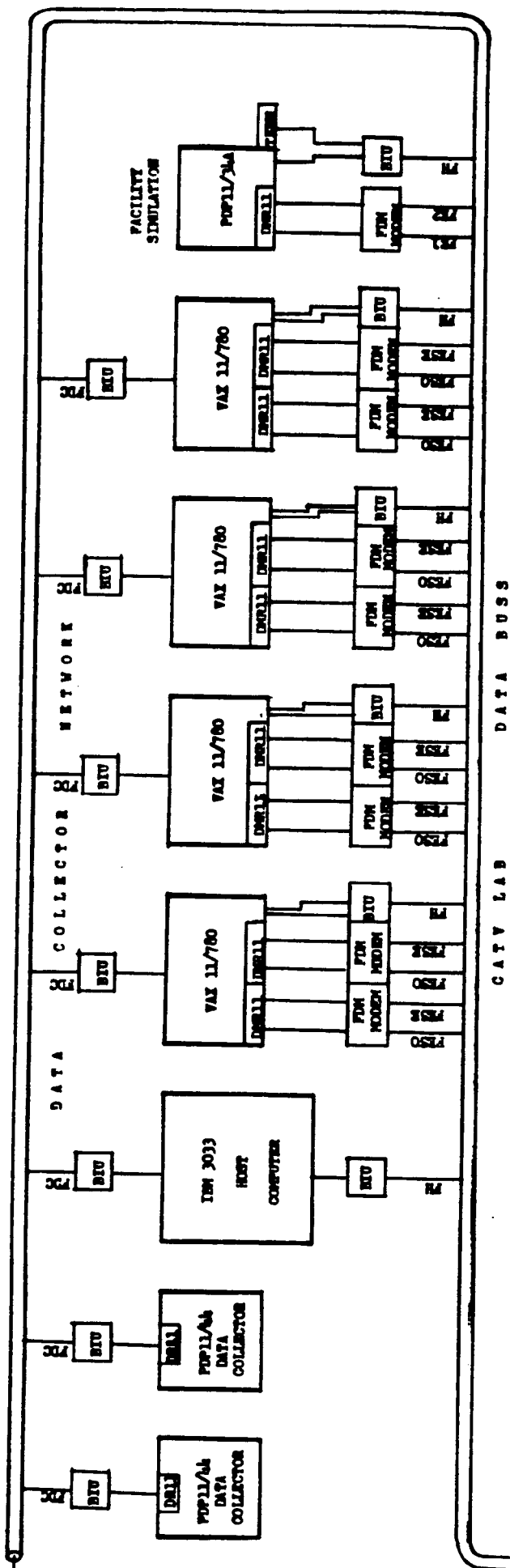
Unibus.....PDP11 and VAX data bus

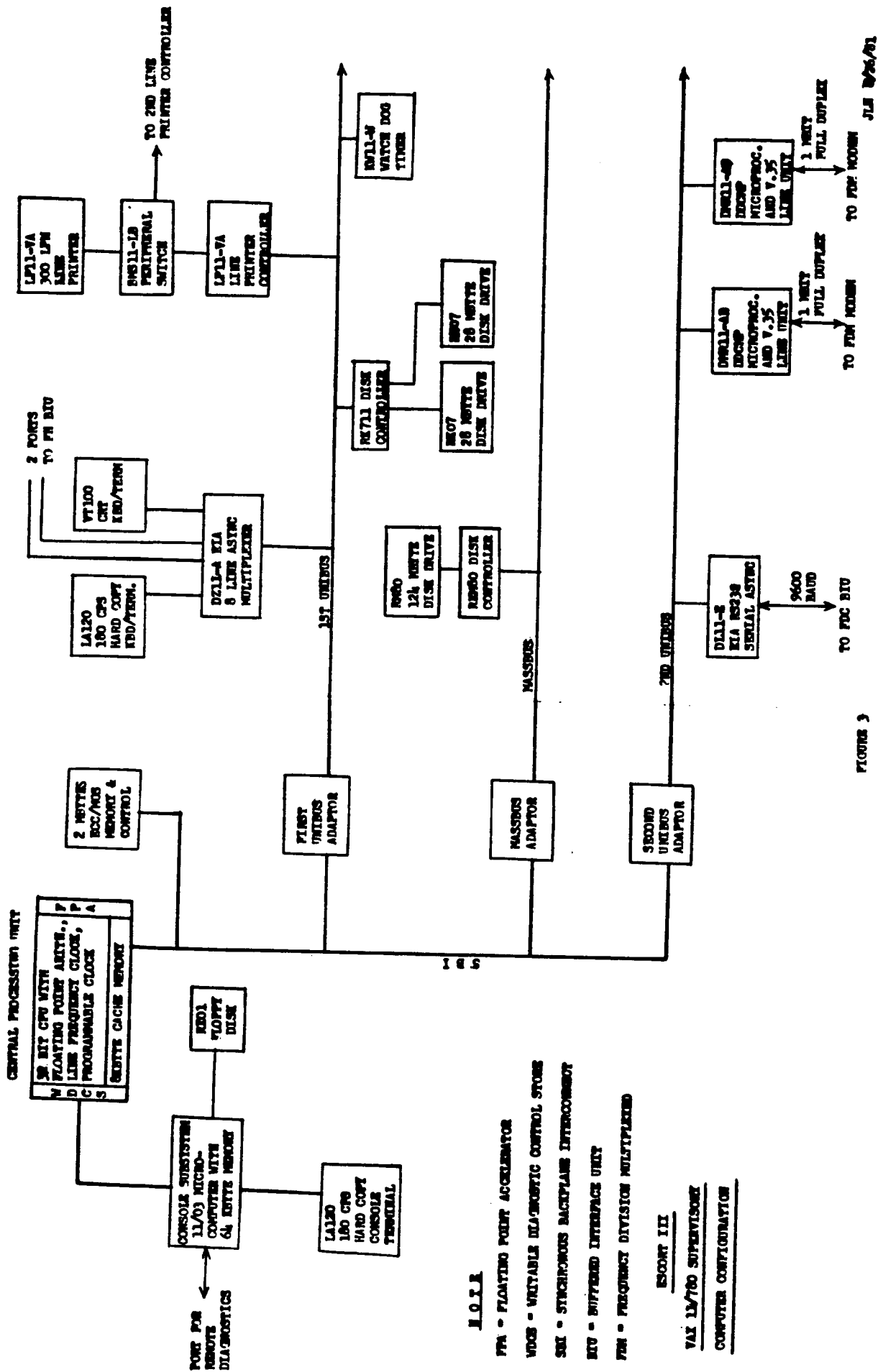
ESORT III SYSTEM BLOCK DIAGRAM



JUN 8/26/81

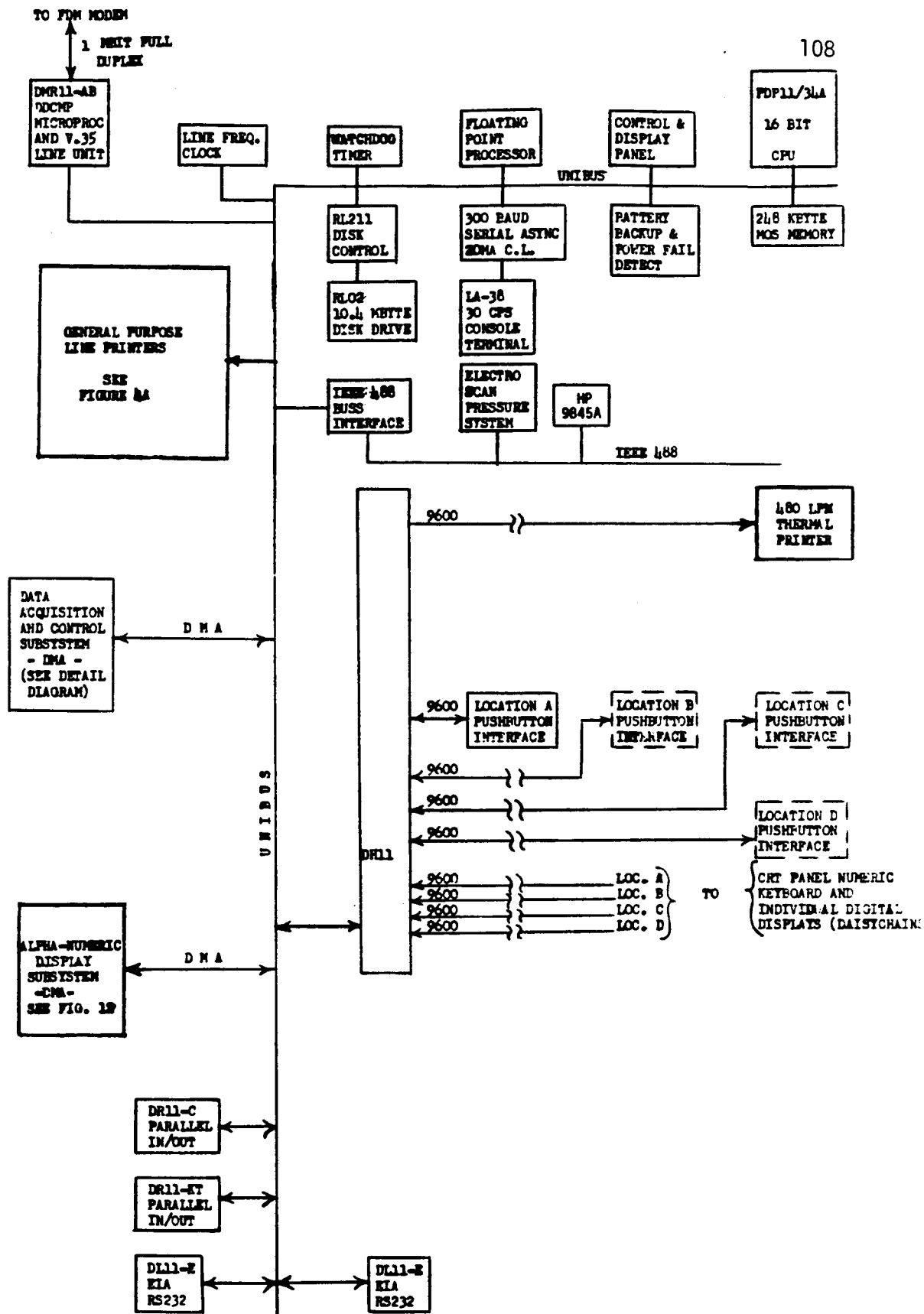
FIGURE 1





1.0.1.1

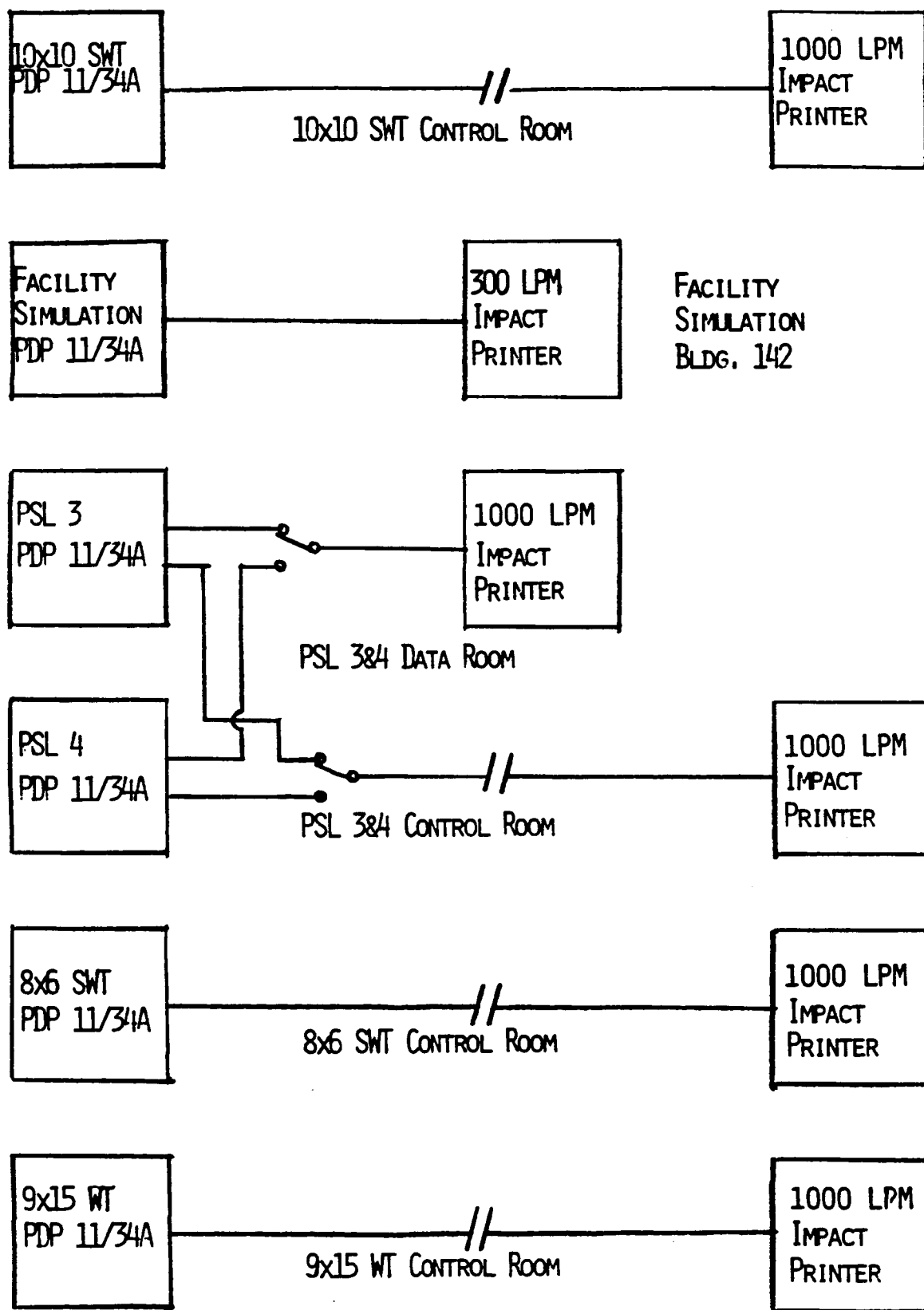
- FPA - FLOATING POINT ACCELERATOR
- WDC - WRITABLE DEJITTERIC CONTROL STORE
- SEL - SYNCHRONOUS BACKPLANE INTERCONNECT
- BITU - BUFFERED INTERFACE UNIT
- PM - FREQUENCY DIVISION MULTIPLEXED



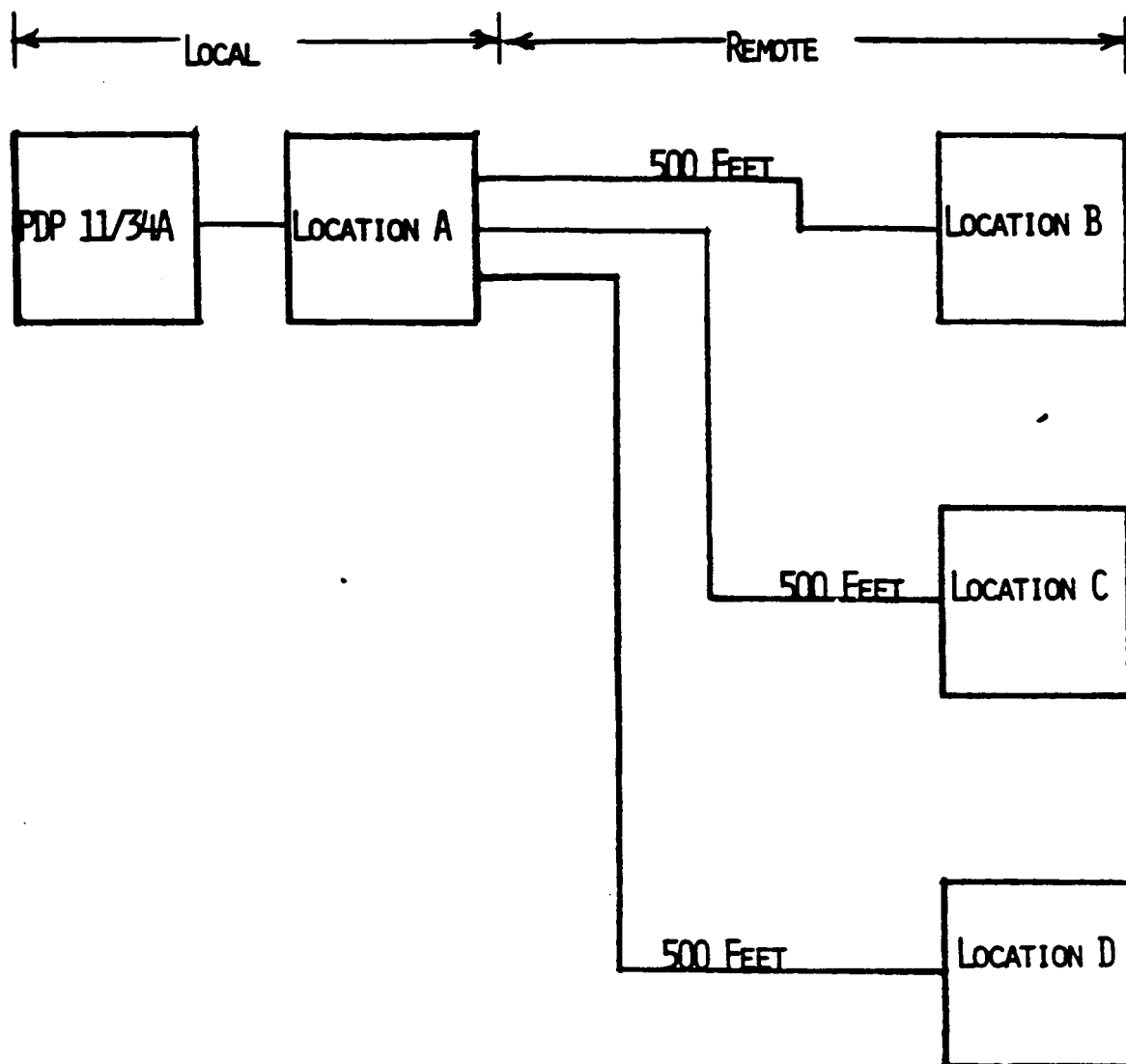
ESCORT III
PDP11/34A FACILITY COMPUTER CONFIGURATION

FIGURE 1

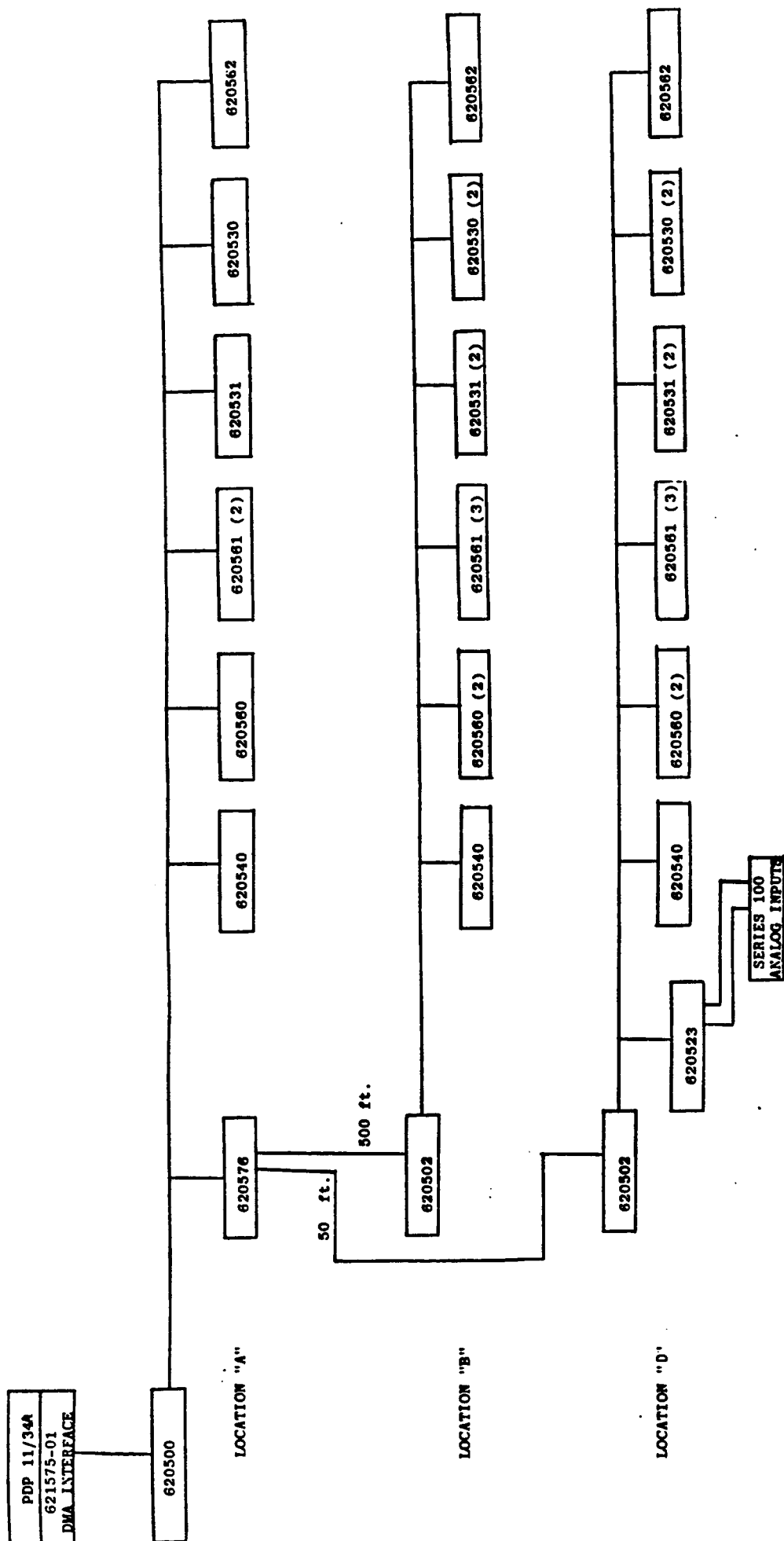
3/2/82
JUN 8/26/81



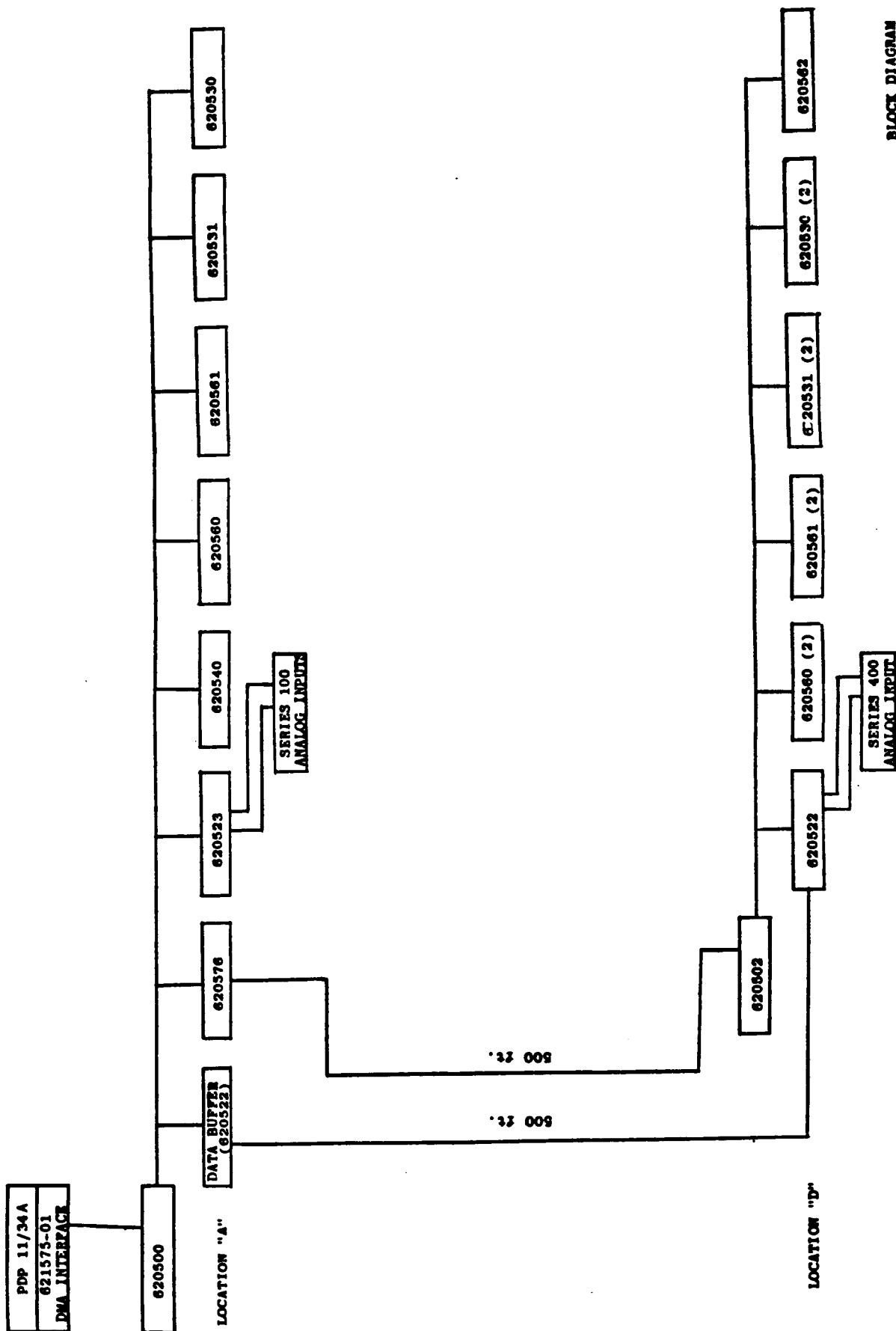
FACILITY COMPUTER
GENERAL-PURPOSE LINE PRINTER
CONFIGURATION DIAGRAMS
FIGURE 4A



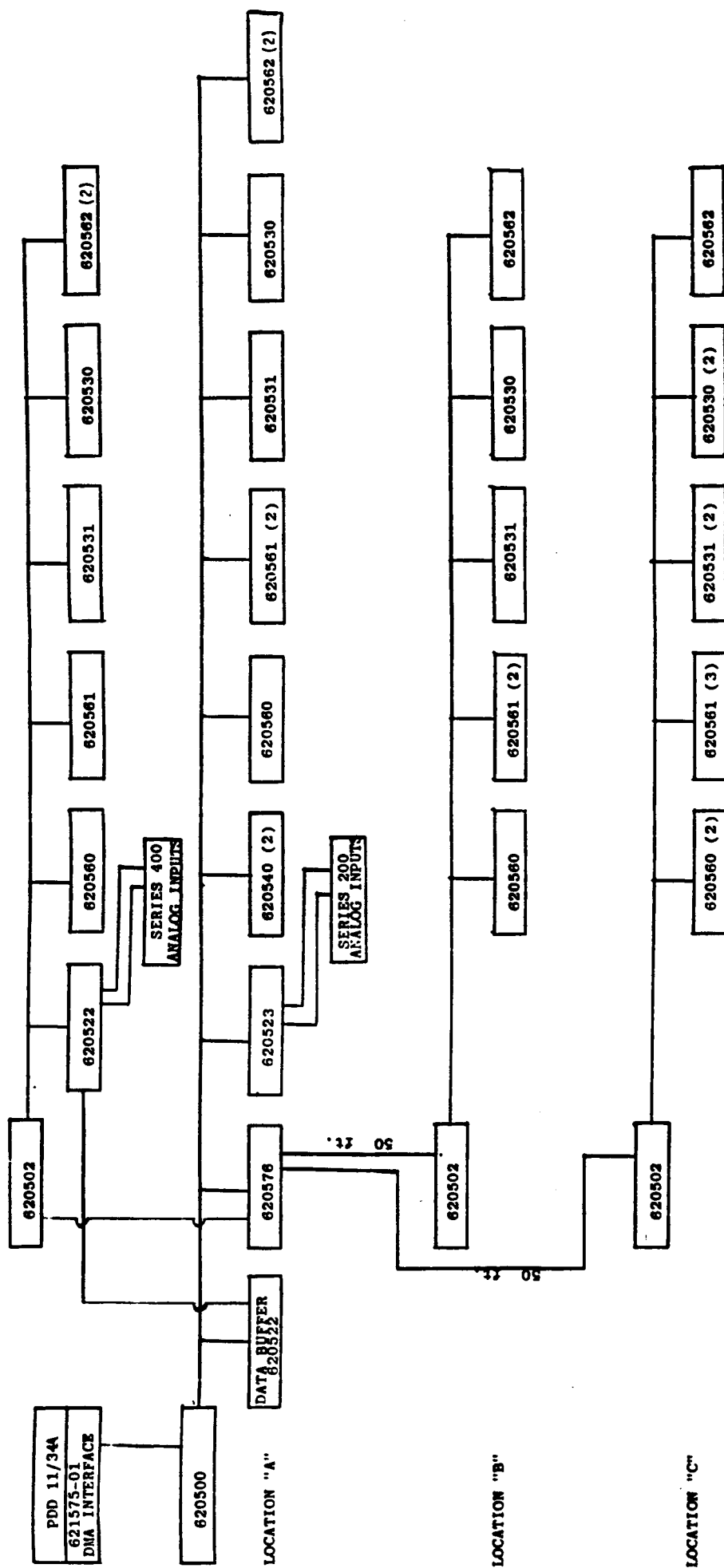
DATA ACQUISITION AND CONTROL
SUBSYSTEM CONFIGURATION LOCATIONS
FIGURE 5



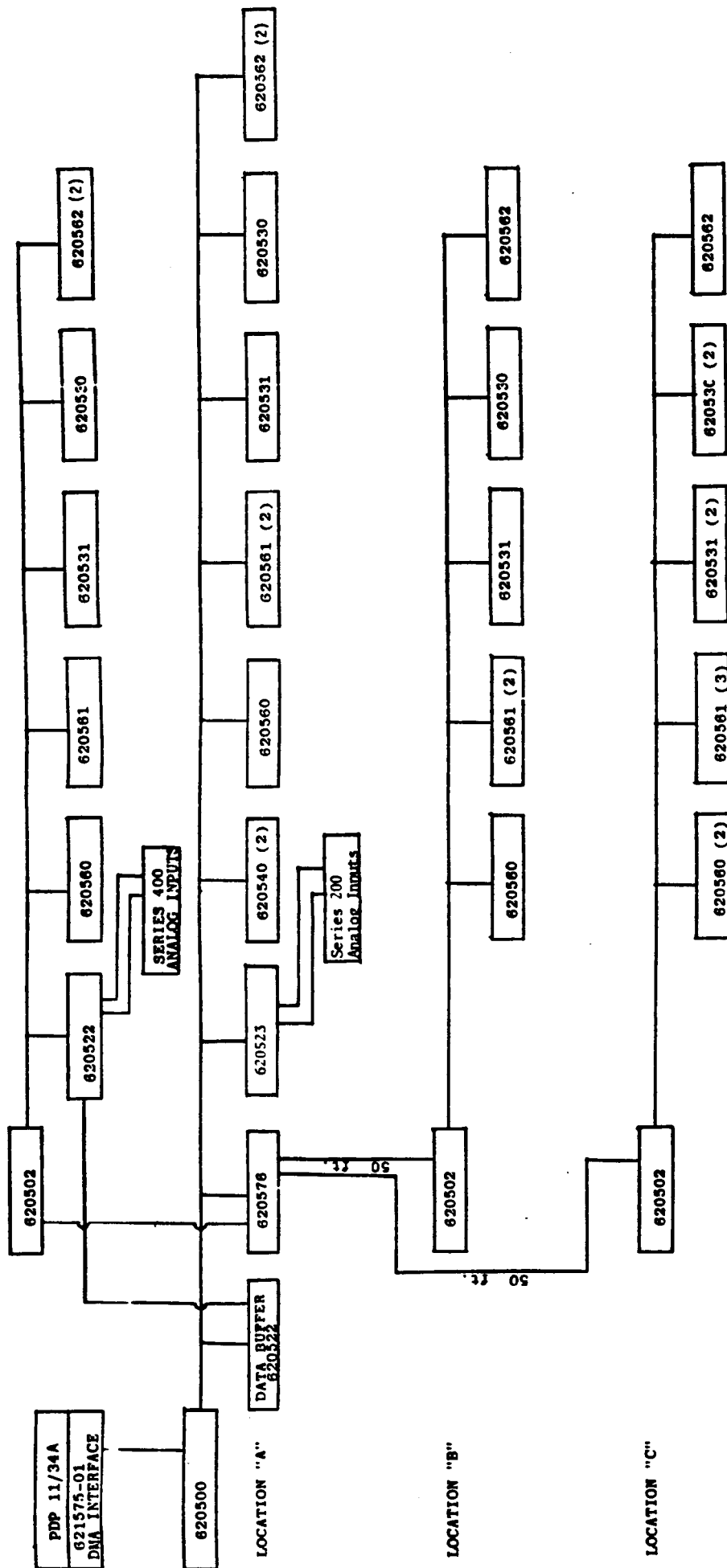
BLOCK DIAGRAM
10 x 10 SWT Configuration
Figure 6



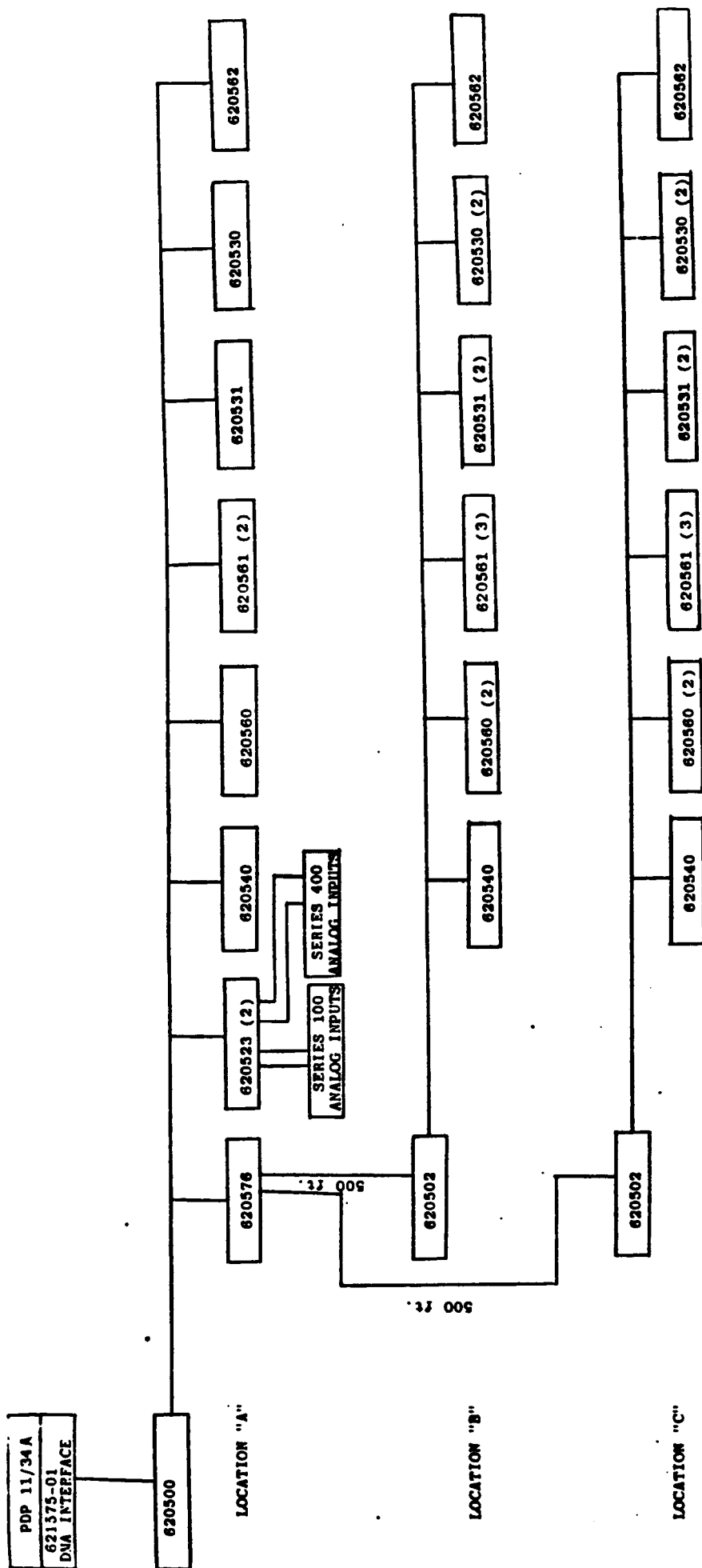
BLOCK DIAGRAM
Facility Simulation Configuration
Figure 7



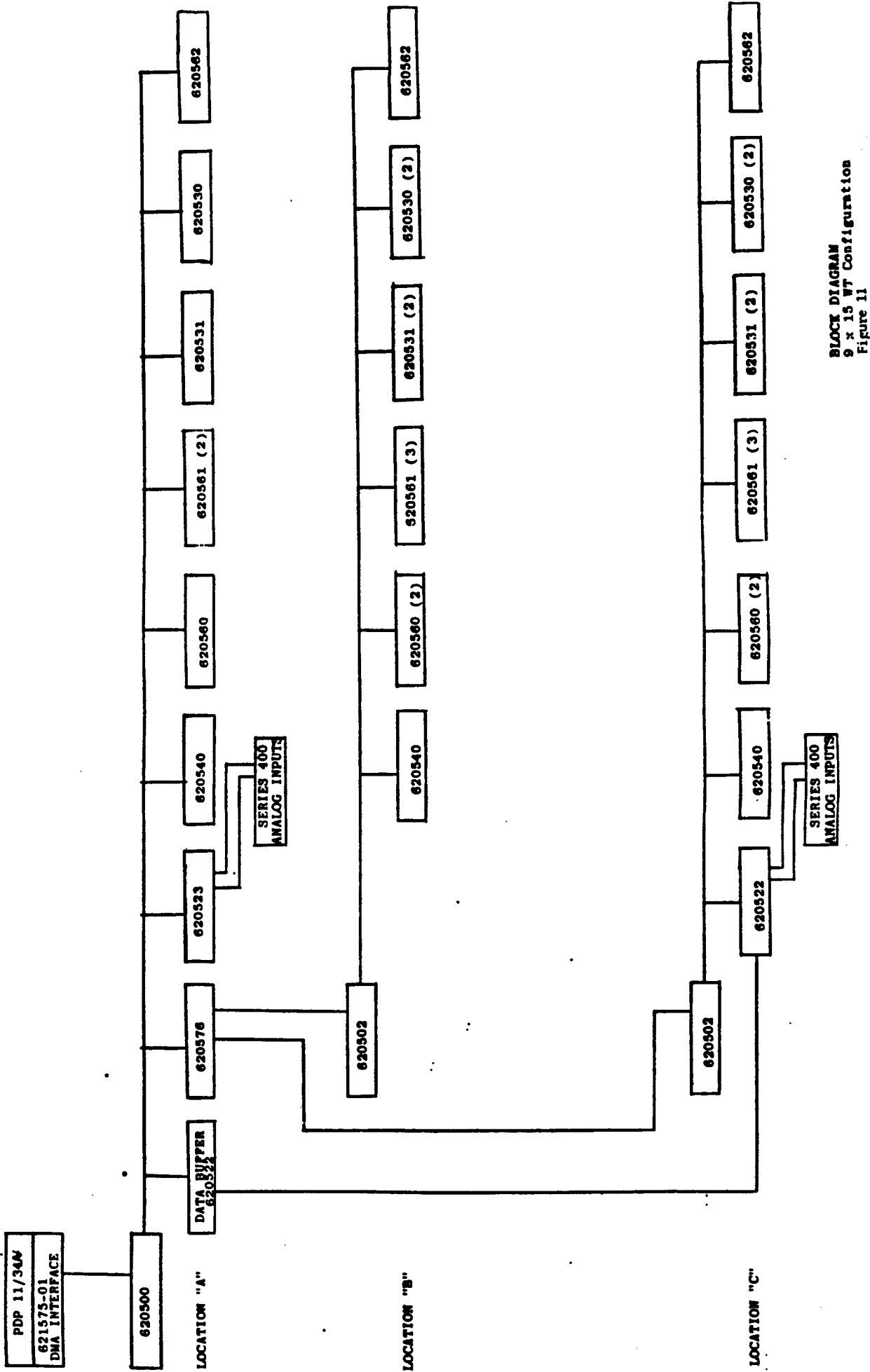
BLOCK DIAGRAM
PSL 3 Configuration
Figure 8



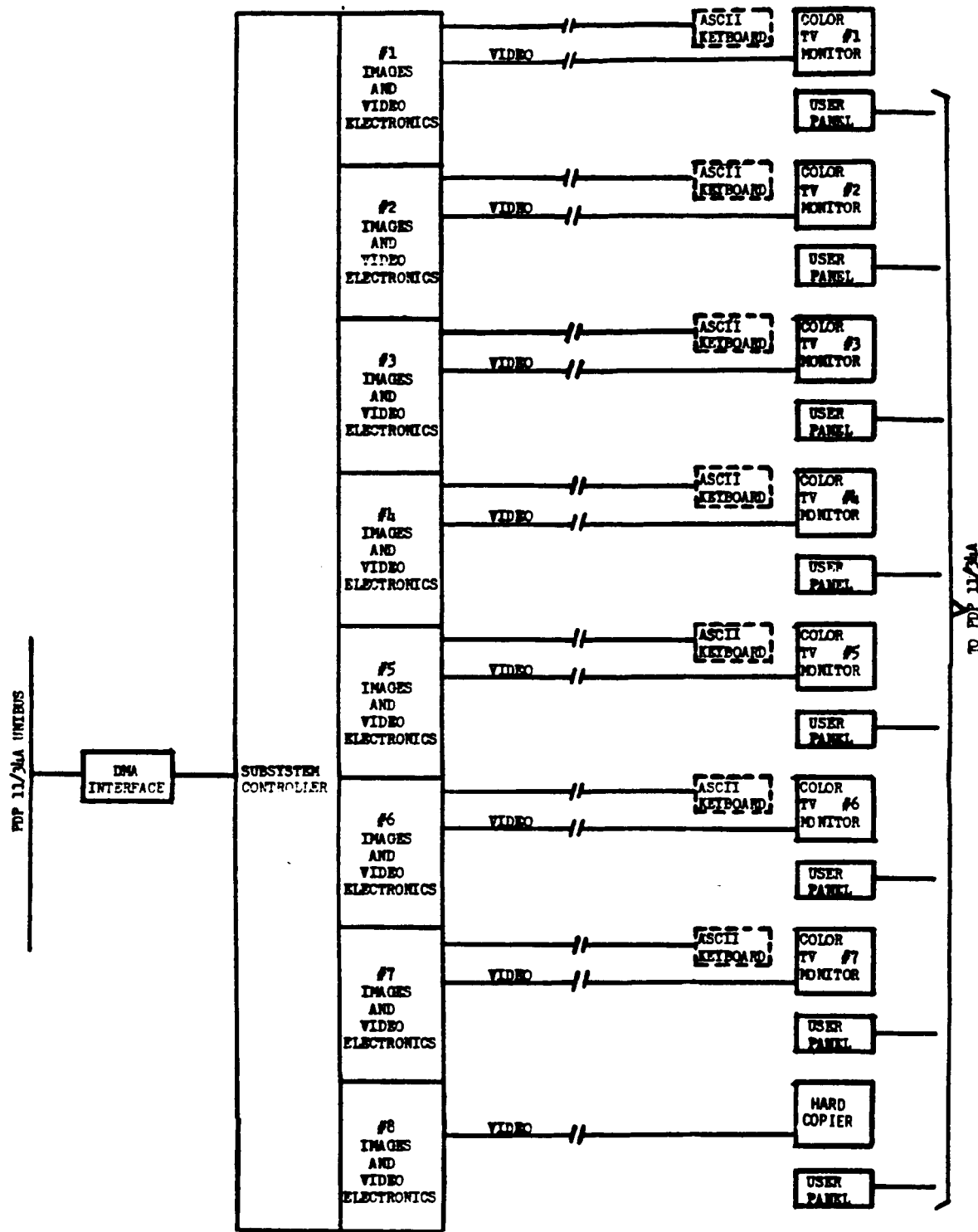
BLOCK DIAGRAM
PSL-4 Configuration
Figure 9



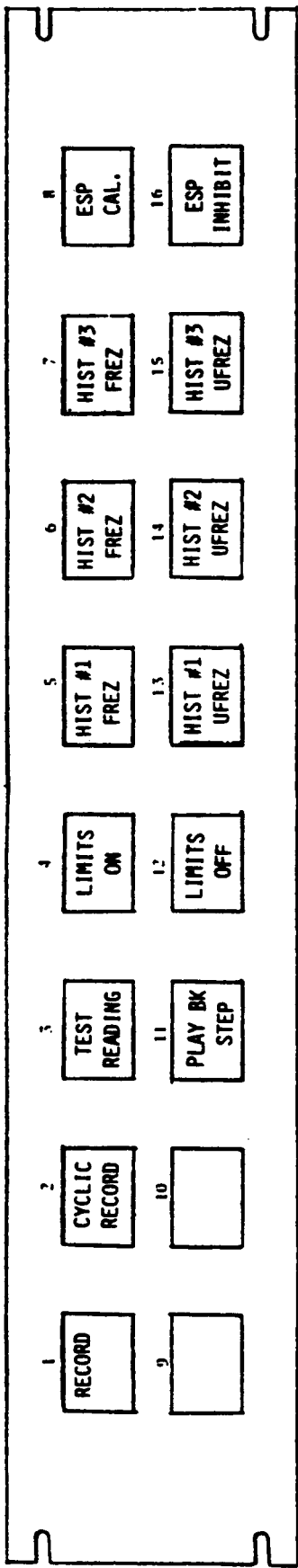
BLOCK DIAGRAM
8 x 6 SWT Configuration
Figure 10



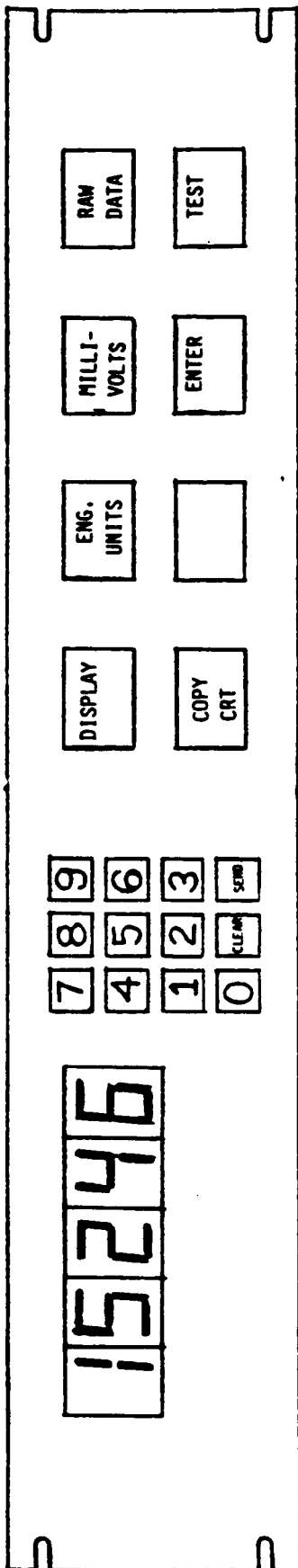
BLOCK DIAGRAM
9 x 15 W7 Configuration
Figure 11



ESCORT III
ALPHA-NUMERIC
DISPLAY SUBSYSTEM



FUNCTION BUTTON PANEL



PANEL LAYOUTS
FIGURE 13

APPENDIX B

NAK ERROR MESSAGESDATA LISTS

Channel sampling list could not be sent to facility computer

<u>TYPE</u>	<u>ERROR MESSAGE</u>
0	LIST TOO LONG
1	CHANNEL NUMBER LOAD ERROR
2	GAIN CODE LOAD ERROR
3	RAM LOAD ERROR
4	TOO MANY VAX LISTS
5	IMPROPER CANCEL REQUEST
6	REQUESTED DATA TYPE NOT IN CONF.
7	INVALID CHANNEL

DATA REQUESTS

No data received from facility computer

<u>TYPE</u>	<u>ERROR MESSAGE</u>
0	FACOM NAK-DATA REQUEST OVERRUN
1	FACOM NAK-CANCEL REQUEST OVERRUN
2	ESP DATA READ ERROR
5	NEFF DATA READ ERROR
7	DATA REQUEST FOR NON-EXISTANT LIST

DATAQ ERROR MESSAGE INTERPRETATION

1. [DATAQ] DATE TIME : EVENT FLAG ERROR

This error represents a hardware problem

2. [DATAQ] DATE TIME : CANNOT FIND LIST # XXXX

A data request is sent before a new list is sent

3. [DATAQ] DATE TIME : CANNOT FIND DATA TYPE XXXX IN CONFIGURATION TABLE

The data type requested is not in the configuration table

4. [DATAQ] DATE TIME : CANNOT ALLOCATE ANOTHER VAX LIST

The data acquisition tasks buffers or the Neff's mux pacer cards control memory is exceeded

5. [DATAQ] DATE TIME : DATA TYPE XXXX IS NOT EQUAL TO FILE TYPE XXXX

The data type must equal the file type

6. [DATAQ] DATE TIME : DATA TYPE XXXX CHANNEL XXXX INVALID

The channel for the given data type is invalid

DIGOUT ERROR MESSAGE INTERPRETATION

1. (DIGOUT) DATE TIME : BAD DIGITAL OUTPUT MESSAGE

Message is not the format expected

2. (DIGOUT) DATE TIME : INVALID TYPE

The type is not available

3. (DIGOUT) DATE TIME : TYPE XXXX CHANNEL XXXX OUT OF RANGE

The type and channel requested are out of range

4. (DIGOUT) DATE TIME : ISB = XXXX IDS = XXXX

Final I/O status error in a WTQ10; final I/O status and directive status are printed on TT0

BUTTON ERROR MESSAGE INTERPRETATION

1. ALL TESTS RUNNING

Displayed on the CRT; all four test tasks are already active

2. VAX RUNNING - 1 TEST MAY RUN

Displayed on the CRT and informs the operator that the VAX is connected to the facility computer, there already is an active TEST task, and that no additional TEST tasks can run at that time

3. BUTTON DATE TIME : IERR IN RDPAN = XXXX

Printed on TT0 and signifies an error in reading the number entry panel

FACOM ERROR/INFORMATION MESSAGE INTERPRETATION

1. [FACOM] DATE TIME : XM INIT

Communication line with VAX was initialized

2. F - [FACOM] DATE TIME : **** JLM KW WDOG ****

10 second response timer with VAX was timed out; will only be active after VAX connect; printed on alarm printer

3. [FACOM] DATE TIME : VAX CONNECT/DISCONNECT

There was a VAX connect or disconnect to the facility computer

4. F - [FACOM] DATE TIME : DISPLAY OV: # XXXX

An Aydin display buffer overwrote a previous display buffer before it was completely written; printed on alarm printer

5. [FACOM] DATE TIME : **** FILE "CCC...CCC" ON DISK

File "CCC...CCC" was downloaded from VAX

6. [FACOM] DATE TIME : XM INIT. ERROR XXXX

A communication initial error occurred

7. [FACOM] DATE TIME : XM READ ERROR XXXX

A communication read error occurred

8. [FACOM] DATE TIME : **** TOO MANY XM COMMUNICATION ERRORS

100 communication errors have occurred; facility tasks are terminated

IDDLPW ERROR MESSAGE INTERPRETATION

1. F - (IDDLPW) DATE TIME : **** BAD IDD UNIT # XXXX

An illegal IDD unit number received from VAX; printed on alarm printer

TIMSET INFORMATION MESSAGE INTERPRETATION

1. VAX TIME : DATE TIME

Printed on console when VAX sends time and date to facility computer;
facility time is set to the VAX time

ESP ERROR MESSAGE INTERPRETATION

1. [XBESP] DATE TIME : SRQ TIMEOUT.ESP PROBABLY OFFLINE

A service request was made by the facility computer, but there was no response from the HP/ESP system.

2. [XBESP] DATE TIME : ESW=X, SEQ=X, ISB=XXXXX, IOST(2)=XXXXX

This specifies the type of error that occurred and its location.